



# **STIC Search Report**

## **EIC 1700**

**STIC Database Tracking Number: 198624**

**TO: Tony S Chuo**  
**Location: REM 6C11**  
**Art Unit : 1745**  
**August 18, 2006**

**Case Serial Number: 10/849182**

**From: Ross Shipe**  
**Location: EIC 1700**  
**REMSSEN 4B31**  
**Phone: 571/272-6018**  
**Ross.Shipe@uspto.gov**

### **Search Notes**

Examiner Chuo:

Please review the attached search results.

Chemical Abstracts indexes the polymer by the monomer units which is what I searched.

If you have any questions or if you would like to refine the search query, please feel free to contact me at any time.

Thanks you for using EIC 1700 search services!

Ross Shipe (ASRC)  
Technical Information Specialist



# SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Chuo Examiner #: \_\_\_\_\_ Date: \_\_\_\_\_  
 Art Unit: \_\_\_\_\_ Phone Number 30 \_\_\_\_\_ Serial Number: 10/879,182  
 Mail Box and Bldg/Room Location: \_\_\_\_\_ Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

\*\*\*\*\*

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: membrane substrate

Inventors (please provide full names): \_\_\_\_\_

Earliest Priority Filing Date: \_\_\_\_\_

*\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

## STAFF USE ONLY

Searcher: <u>205</u>	Type of Search	Vendors and cost where applicable
Searcher Phone #: _____	NA Sequence (#) _____	STN <u>✓</u>
Searcher Location: _____	AA Sequence (#) _____	Dialog _____
Date Searcher Picked Up: _____	Structure (#) <u>1</u>	Questel/Orbit _____
Date Completed: <u>8/18/06</u>	Bibliographic _____	Dr.Link _____
Searcher Prep & Review Time: <u>30</u>	Litigation _____	Lexis/Nexis _____
Clerical Prep Time: _____	Fulltext _____	Sequence Systems _____
Online Time: <u>24</u>	Patent Family _____	WWW/Internet _____
	Other _____	Other (specify) _____

Anekwe, Imelda (ASRC)

198624

From: TONY CHUO [Tony.Chuo@uspto.gov]  
Sent: Monday, August 14, 2006 4:42 PM  
To: STIC-EIC1700  
Subject: Database Search Request, Serial Number: 10849182

Requester: TONY CHUO (P/1745)  
Art Unit: GROUP ART UNIT 1745  
Employee Number: 81950  
Office Location: REM 06C11  
Phone Number: (571)272-0717  
Mailbox Number:

SCIENTIFIC REFERENCE BR  
Sci & Tech Inf. Cntr.

AUG 14, 2006

Pat. & T.M. Office

Case serial number: 10849182  
Class / Subclass(es): 429/33  
Earliest Priority Filing Date: 5/21/03  
Format preferred for results: Paper

Search Topic Information:

A fuel cell electrolyte membrane comprising a sulfonic acid group-containing polyarylene that is produced by coupling polymerizing an aromatic sulfonic acid ester represented by general formula (A) and an aromatic compound represented by general formula (B-1) or (B-2). Specific examples of the aromatic compound represented by the general formula (B-1) is 4,4-bis(4-chlorophenyl)diphenyl ether dicarboxylate, etc (See Specification, page 16).

Special Instructions and Other Comments:



## UNITED STATES PATENT AND TRADEMARK OFFICE

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 Address: COMMISSIONER FOR PATENTS  
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 Alexandria, Virginia 22313-1450  
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Bib Data Sheet

CONFIRMATION NO. 7254

<b>SERIAL NUMBER</b> 10/849,182	<b>FILING OR 371(c) DATE</b> 05/20/2004 <b>RULE</b>	<b>CLASS</b> 429	<b>GROUP ART UNIT</b> 1745	<b>ATTORNEY DOCKET NO.</b> 253303USO	
<b>APPLICANTS</b> Takashi Okada, Tokyo, JAPAN; Kohei Goto, Tokyo, JAPAN;					
<b>** CONTINUING DATA *****</b>					
<b>** FOREIGN APPLICATIONS *****</b> JAPAN 2003-143914 05/21/2003					
<b>IF REQUIRED, FOREIGN FILING LICENSE GRANTED</b> <b>** 09/21/2004</b>					
Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no 35 USC 119 (a-d) conditions <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after Allowance Verified and Acknowledged _____ Examiner's Signature _____ Initials _____		<b>STATE OR COUNTRY</b> JAPAN	<b>SHEETS DRAWING</b> 15	<b>TOTAL CLAIMS</b> 3	<b>INDEPENDENT CLAIMS</b> 2
<b>ADDRESS</b> 22850					
<b>TITLE</b> Membrane-electrode assembly for direct methanol type fuel cell and proton conductive membrane					
<b>FILING FEE RECEIVED</b> 770	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

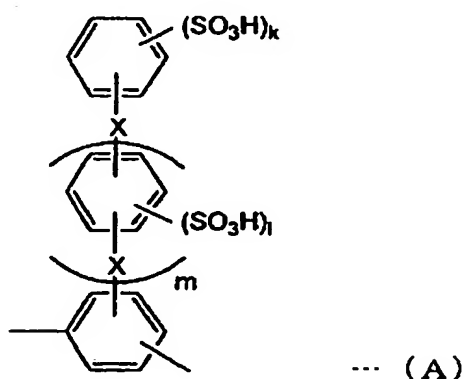


## ABSTRACT OF THE DISCLOSURE

A membrane-electrode assembly for direct methanol type fuel cell and a proton conductive membrane for direct methanol type fuel cell are disclosed. The membrane-electrode assembly comprises a negative electrode and a positive electrode assembled via a proton conductive membrane, the negative electrode being provided with a negative electrode-side separator having a mechanism for feeding a methanol aqueous solution as a fuel, the positive electrode being provided with a positive electrode-side separator having a mechanism for feeding an oxidizing agent gas, and the proton conductive membrane comprising a polymer containing 0.05-99.95 mol% of a repeating constitutional unit represented by the formula (A), and 0.05-99.95 mol% of a repeating constitutional unit represented by the formula (B).

# WHAT IS CLAIMED IS:

1. A membrane-electrode assembly for direct methanol type fuel cell comprising a negative electrode and a positive electrode assembled via a proton conductive membrane, the negative electrode being provided with a negative electrode-side separator having a mechanism for feeding a methanol aqueous solution as a fuel, the positive electrode being provided with a positive electrode-side separator having a mechanism for feeding an oxidizing agent gas, and the proton conductive membrane comprising a polymer containing 0.05-99.95 mol% of a repeating constitutional unit represented by the following general formula (A):



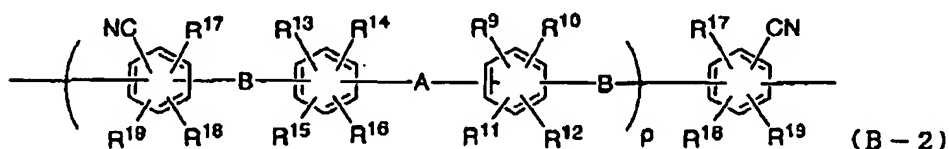
wherein X represents a single bond (—) or an electron withdrawing group or electron donating group;  $\underline{m}$  represents an integer of 0-10; when  $\underline{m}$  is 1-10, Xs may be the same or different;  $\underline{k}$  represents an integer of 0-5;  $\underline{l}$  represents an integer of 0-4; and  $(k + l) \geq 1$ , and 0.05-99.95 mol% of a repeating constitutional unit represented by the following general formula (B):



wherein Y represents a hydrophobic divalent flexural group.

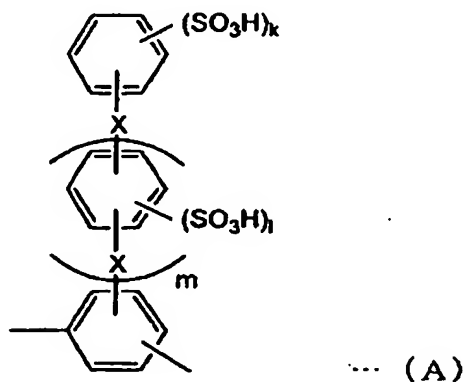
atom or group selected from the group consisting of an alkylene group, a fluorine-containing alkylene group, an aryl-substituted alkylene group, an alkenylene group, an alkynylene group, an arylene group, a fluorenylidene group, -O-, -S-, -CO-, -CONH-, -COO-, -SO-, and -SO<sub>2</sub>-; and

p represents 0 or a positive integer;



wherein R<sup>9</sup> to R<sup>19</sup> may be the same or different and each represents at least one atom or group selected from the group consisting of hydrogen atom, fluorine atom, an alkyl group, a fluorine-substituted alkyl group, an allyl group, an aryl group, and a cyano group; A represents a single bond or a divalent electron withdrawing group; B represents a divalent donating group; and p represents 0 or a positive integer.

3. A proton conductive membrane for direct methanol type fuel cell comprising a polymer containing 0.05-99.95 mol% of a repeating constitutional unit represented by the following general formula (A):



wherein X represents a single bond (-) or an electron withdrawing group or electron

donating group;  $\underline{m}$  represents an integer of 0-10; when  $\underline{m}$  is 1-10, Xs may be the same or different;  $\underline{k}$  represents an integer of 0-5;  $\underline{l}$  represents an integer of 0-4; and  $(k + l) \geq 1$ , and 0.05-99.95 mol% of a repeating constitutional unit represented by the following general formula (B):



wherein Y represents a hydrophobic divalent flexural group.



# STIC Search Results Feedback Form

**EIC17000**

Questions about the scope or the results of the search? Contact *the EIC searcher* or contact:

Kathleen Fuller, EIC 1700 Team Leader  
571/272-2505 REMSEN 4B28

## Voluntary Results Feedback Form

- > I am an examiner in Workgroup:  Example: 1713  
> Relevant prior art found, search results used as follows:

- ☐ 102 rejection
- ☐ 103 rejection
- ☐ Cited as being of interest.
- ☐ Helped examiner better understand the invention.
- ☐ Helped examiner better understand the state of the art in their technology.

Types of relevant prior art found:

- ☐ Foreign Patent(s)
- ☐ Non-Patent Literature  
(journal articles, conference proceedings, new product announcements etc.)

> Relevant prior art **not** found:

- ☐ Results verified the lack of relevant prior art (helped determine patentability).
- ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

Drop off or send completed forms to EIC1700 REMSEN 4B28

=> d his full

(FILE 'HOME' ENTERED AT 09:09:17 ON 18 AUG 2006)

FILE 'REGISTRY' ENTERED AT 09:09:45 ON 18 AUG 2006

L1 STR  
L2 50 SEA SSS SAM L1  
L3 108313 SEA SSS FUL L1  
SAV L3 CHU182/A

FILE 'HCAPLUS' ENTERED AT 09:13:46 ON 18 AUG 2006

L4 65232 SEA ABB=ON PLU=ON L3  
L5 9613 SEA ABB=ON PLU=ON L4 (L) PREP/RL  
L6 20 SEA ABB=ON PLU=ON L4 (L) PREP/RL (L) MEMBRANE# (2A)  
ELECTRODE?  
L7 58 SEA ABB=ON PLU=ON L4 (L) PREP/RL AND MEMBRANE# (2A)  
ELECTRODE?  
L8 12 SEA ABB=ON PLU=ON L4 (L) PREP/RL AND MEMBRANE# (2A)  
ELECTRODE? (L) METHANOL?  
L11 39 SEA ABB=ON PLU=ON L4 (L) MEMBRANE# (2A) ELECTRODE?  
L12 2 SEA ABB=ON PLU=ON L4 (L) MEMBRANE# (2A) ELECTRODE? (L)  
METHANOL?  
L13 12 SEA ABB=ON PLU=ON L4 AND MEMBRANE# (2A) ELECTRODE? (L)  
L14 24 SEA ABB=ON PLU=ON L4 (L) MEMBRANE# (2A) ELECTRODE? (L)  
FUEL (2A) CELL?  
L15 34 SEA ABB=ON PLU=ON L6 OR L8 OR L12 OR L13 OR L14

=> file reg

FILE 'REGISTRY' ENTERED AT 09:31:39 ON 18 AUG 2006

USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.

PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

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=> d l15 que stat

L1 STR  
5  
O  
||| 4  
Cb~G1~Cb~S~O  
1 2 3 ||| 7  
O  
6

REP G1=(0-3) A

NODE ATTRIBUTES:

DEFAULT MLEVEL IS ATOM

GGCAT IS UNS AT 1

GGCAT IS UNS AT 3

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 7

STEREO ATTRIBUTES: NONE

L3 108313 SEA FILE=REGISTRY SSS FUL L1  
L4 65232 SEA FILE=HCAPLUS ABB=ON PLU=ON L3  
L6 20 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 (L) PREP/RL (L)  
MEMBRANE# (2A) ELECTRODE?  
L8 12 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 (L) PREP/RL AND  
MEMBRANE# (2A) ELECTRODE? (L) METHANOL?  
L12 2 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 (L) MEMBRANE# (2A)

L13 ELECTRODE? (L) METHANOL?  
 12 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 AND MEMBRANE# (2A)  
 ELECTRODE? (L) METHANOL?  
 L14 24 SEA FILE=HCAPLUS ABB=ON PLU=ON L4 (L) MEMBRANE# (2A)  
 ELECTRODE? (L) FUEL (2A) CELL?  
 L15 34 SEA FILE=HCAPLUS ABB=ON PLU=ON L6 OR L8 OR L12 OR L13  
 OR L14

=> file hcaplus

FILE 'HCAPLUS' ENTERED AT 09:31:50 ON 18 AUG 2006

USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.

PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

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=> d l15 1-34 ibib abs hitstr hitind

L15 ANSWER 1 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:680892 HCAPLUS

DOCUMENT NUMBER: 145:149074

TITLE: Phase separation-type polymer electrolyte  
 membrane, its manufacture, membrane-electrode  
 assembly using the membrane, and fuel cell  
 INVENTOR(S): Fukuchi, Iwao; Kamijima, Kouichi; Sasaki,  
 Shoichi; Nakazawa, Satoshi; Orita, Akihiro;  
 Takeda, Shinji

PATENT ASSIGNEE(S): Hitachi Chemical Company, Ltd., Japan

SOURCE: PCT Int. Appl., 76 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006073146	A1	20060713	WO 2006-JP300007	20060104

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA,  
 CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
 GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM,  
 KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG,  
 MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT,  
 RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT,  
 TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW  
 RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU,  
 IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR,  
 BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD,  
 TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
 ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

PRIORITY APPLN. INFO.: JP 2005-46

A

20050104

AB The electrolyte membrane has a domain phase comprising an  
 electrolyte polymer (A) and a matrix phase comprising a polymer (B)  
 inhibiting the ingredient (A) from swelling; where the membrane  
 further has a substantially continuous 3-dimensional structure which  
 enables proton transfer among the domains of (A). The electrolyte  
 membrane is manufd. by melting the polymer(A) and the polymer (B),  
 or dissolving the 2 polymers in a solvent to obtain a polymer mixt.,  
 applying the mixt. on a substrate, and drying. The

membrane-electrode assembly has the above electrolyte membrane on an electrode. The fuel cell uses the above assembly.

IT 875640-02-1

RL: DEV (Device component use); USES (Uses)

(structure and manuf. of polymer electrolyte membranes having 3-dimensional structures for membrane-electrode assemblies in fuel cells)

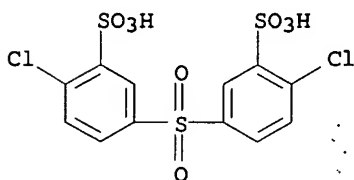
RN 875640-02-1 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with 4,4'-oxybis[phenol] and 1,1'-sulfonylbis[4-chlorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

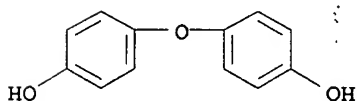


● 2 Na

CM 2

CRN 1965-09-9

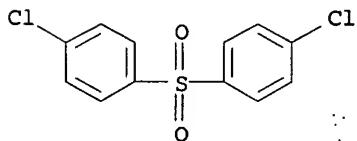
CMF C12 H10 O3



CM 3

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 7440-44-0, Carbon, uses 9002-84-0, Teflon 875640-02-1

898254-19-8

RL: DEV (Device component use); USES (Uses)

(structure and manuf. of polymer electrolyte membranes having 3-dimensional structures for membrane-electrode assemblies in fuel cells)

Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

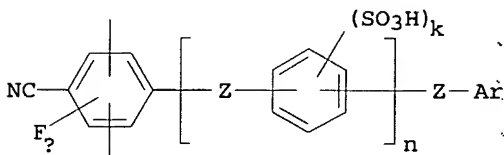


REFERENCE COUNT: 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L15 ANSWER 2 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2006:633011 HCAPLUS  
 DOCUMENT NUMBER: 145:106788  
 TITLE: Membrane-electrode assembly for fuel cell  
 INVENTOR(S): Otsuki, Toshitaka; Kaneoka, Takeshi; Iguchi, Masaru; Soma, Hiroshi  
 PATENT ASSIGNEE(S): Jsr Ltd., Japan; Honda Motor Co., Ltd.  
 SOURCE: Jpn. Kokai Tokkyo Koho, 34 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006172861	A2	20060629	JP 2004-362662	20041215
PRIORITY APPLN. INFO.:				20041215

GI



AB The assembly has a solid polymer electrolyte membrane bonded between a pair of electrodes contg. a gas diffusion layer and a catalyst layer contacting the electrolyte membrane; where the electrolyte membrane comprising a sulfonated polyarylene having structural unit I [Z = -CO, -SO<sub>2</sub>, -SO, -CONH, -COO, -(CF<sub>2</sub>)<sub>i</sub>, -C(CF<sub>3</sub>)<sub>2</sub>, -(CH<sub>2</sub>)<sub>j</sub>, -C(CH<sub>3</sub>)<sub>2</sub>, -O, -S, and/or direct bond; i = integer 1-10; j = integer 1-10; Ar = arom. group with -SO<sub>3</sub>H substituent; m = 1 or 2; n = integer 0-10; and k = integer 1-4].

IT 895145-23-0D, hydrolyzed 895145-26-3D, hydrolyzed  
 895145-28-5D, hydrolyzed

RL: DEV (Device component use); FMU (Formation, unclassified); FORM (Formation, nonpreparative); USES (Uses)

(electrolyte membranes contg. sulfonated polyarylenes for membrane-electrode assemblies in fuel cells)

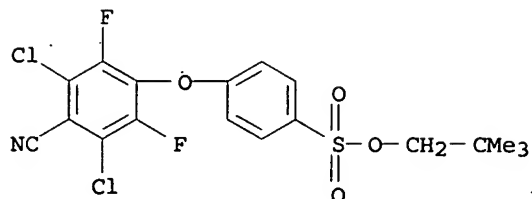
RN 895145-23-0 HCAPLUS

CN Benzenesulfonic acid, 4-(3,5-dichloro-4-cyano-2,6-difluorophenoxy)-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

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CRN 895145-18-3

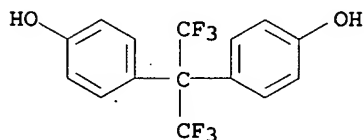
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CM 2

CRN 1478-61-1

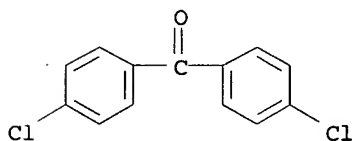
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



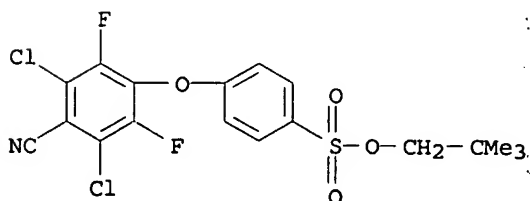
RN 895145-26-3 HCAPLUS

CN Benzenesulfonic acid, 4-(3,5-dichloro-4-cyano-2,6-difluorophenoxy)-, 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile and 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethylenediylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

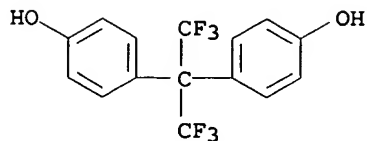
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CMF C18 H15 Cl2 F2 N O4 S



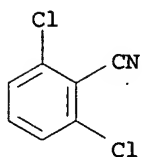
CM 2

CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 3

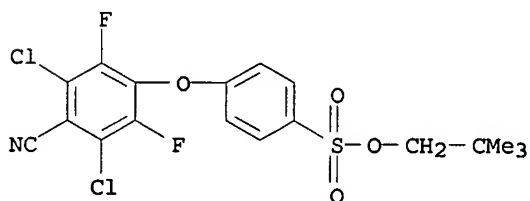
CRN 1194-65-6  
CMF C7 H3 Cl2 N



RN 895145-28-5 HCAPLUS  
CN Benzenesulfonic acid, 4-(3,5-dichloro-4-cyano-2,6-difluorophenoxy)-, 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile, 4,4'-(9H-fluoren-9-ylidene)bis[phenol] and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethyldiene]bis[phenol] (9CI) (CA INDEX NAME)

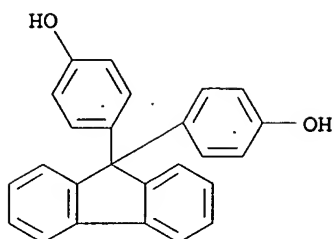
CM 1

CRN 895145-18-3  
CMF C18 H15 Cl2 F2 N O4 S



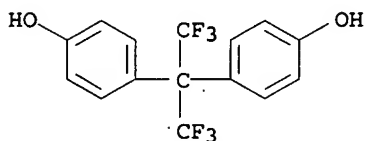
CM 2

CRN 3236-71-3  
CMF C25 H18 O2



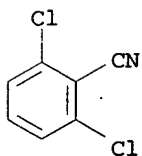
CM 3

CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 4

CRN 1194-65-6  
CMF C7 H3 Cl2 N

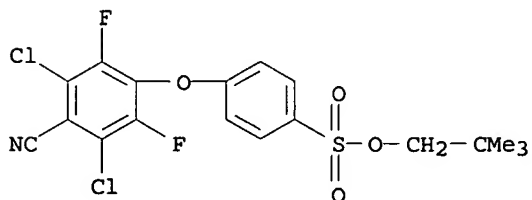


IT 895145-18-3

RL: RCT (Reactant); RACT (Reactant or reagent)  
(electrolyte membranes contg. sulfonated polyarylenes for  
membrane-electrode assemblies in fuel  
cells)

RN 895145-18-3 HCAPLUS

CN INDEX NAME NOT YET ASSIGNED



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 895145-23-0D, hydrolyzed 895145-26-3D, hydrolyzed  
895145-28-5D, hydrolyzed

RL: DEV (Device component use); FMU (Formation, unclassified); FORM  
(Formation, nonpreparative); USES (Uses)

(electrolyte membranes contg. sulfonated polyarylenes for  
membrane-electrode assemblies in fuel  
cells)

IT 69266-28-0 122325-09-1 193410-36-5 193410-37-6 849729-09-5  
895145-18-3

RL: RCT (Reactant); RACT (Reactant or reagent)  
(electrolyte membranes contg. sulfonated polyarylenes for  
membrane-electrode assemblies in fuel  
cells)

L15 ANSWER 3 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:579730 HCAPLUS

DOCUMENT NUMBER: 145:48601

TITLE: Membrane-electrode assembly for fuel cell

INVENTOR(S): Otsuki, Toshihiro; Kanaoka, Nagayuki; Iguchi,  
Masaru; Soma, Hiroshi

PATENT ASSIGNEE(S): Jsr Corporation and, Japan; Honda Motor Co., Ltd

SOURCE: U.S. Pat. Appl. Publ., 35 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

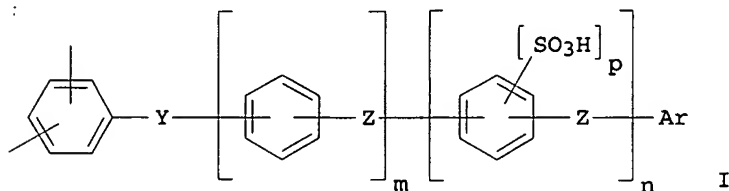
LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2006127728	A1	20060615	US 2005-302346	200512 14
JP 2006172862	A2	20060629	JP 2004-362663	200412 15
JP 2006172863	A2	20060629	JP 2004-362664	200412 15
PRIORITY APPLN. INFO.:			JP 2004-362663	A 200412 15
			JP 2004-362664	A 200412 15

GI



AB The present invention provides a membrane-electrode assembly for fuel cell which comprises a solid polymer electrolyte membrane comprising a specific polyarylene having a sulfonic acid group and has excellent creep resistance, power generation performance and durability against power generation under high-temp. environment. The membrane-electrode assembly is characterized in that a pair of electrodes each comprising a gas diffusing layer and a catalyst layer are joined to both sides of a solid polymer electrolyte

membrane so that the catalyst layer side comes into contact with the membrane, the membrane comprises a sulfonated polyarylene comprising constituent unit represented by the following formula (I): wherein Y is a group represented by  $-C(CF_3)_2-$ ,  $(CF_2)_i-$ , wherein i is an integer of 1 to 10,  $-SO-$  or  $-SO_2-$ ; Z is a divalent electron-donating group or a direct bond; Ar is an arom. group having a substituent represented by  $-SO_3H$ ; m is an integer of 0 to 10; n is an integer of 0 to 10; and p is an integer of 1 to 4.

IT 889850-39-9DP, hydrolyzed 889850-40-2DP,  
hydrolyzed 889850-41-3P 889850-43-5DP,  
hydrolyzed 889850-44-6DP, hydrolyzed 889850-45-7DP  
, hydrolyzed

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)

(membrane-electrode assembly for fuel  
cell)

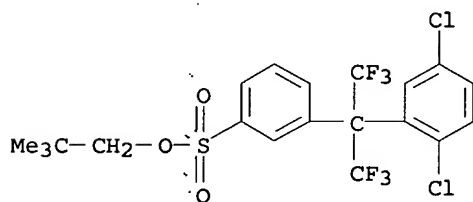
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CN Benzenesulfonic acid, 3-[1-(2,5-dichlorophenyl)-2,2,2-trifluoro-1-(trifluoromethyl)ethyl]-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 889850-38-8

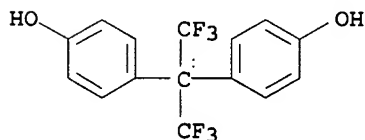
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CRN 1478-61-1

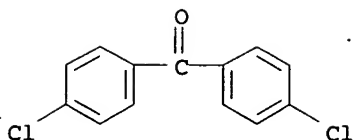
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CM 3

CRN 90-98-2

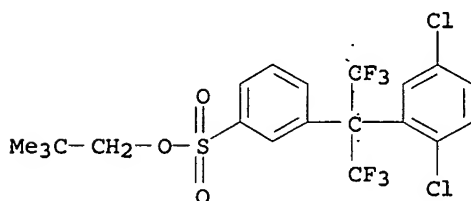
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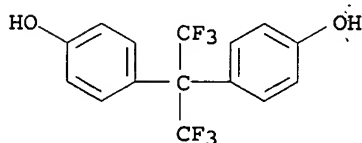
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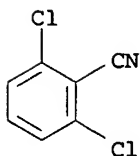
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CRN 1478-61-1  
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CM 3

CRN 1194-65-6  
 CMF C7 H3 Cl2 N



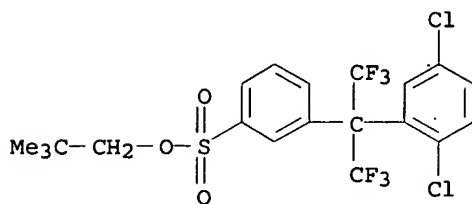
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(9CI) (CA INDEX NAME)

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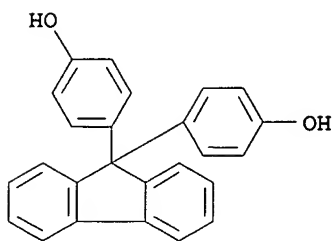
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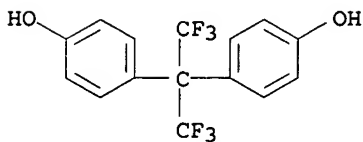
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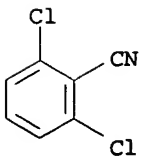
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CRN 1194-65-6

CMF C7 H3 Cl2 N



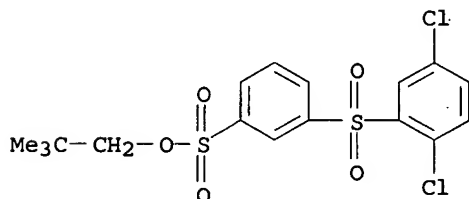


RN 889850-43-5 HCAPLUS  
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 and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]  
 (9CI) (CA INDEX NAME)

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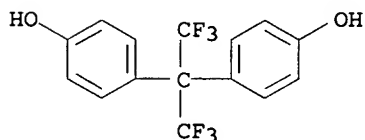
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CM 2

CRN 1478-61-1

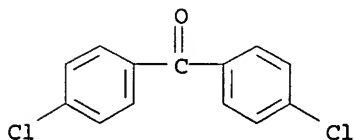
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CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O

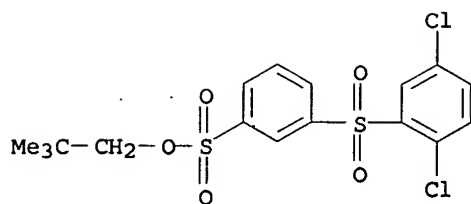


RN 889850-44-6 HCAPLUS  
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 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile and  
 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]  
 (9CI) (CA INDEX NAME)

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CRN 889850-42-4

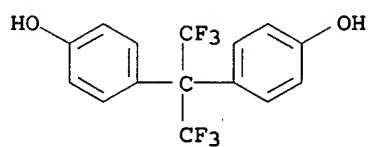
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CRN 1478-61-1

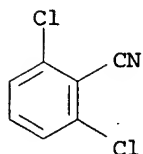
CMF C15 H10 F6 O2



CM 3

CRN 1194-65-6

CMF C7 H3 Cl2 N



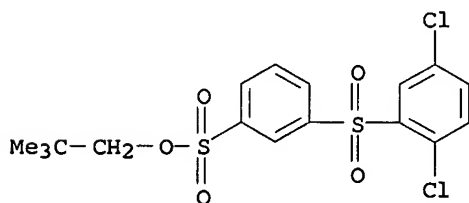
RN 889850-45-7 HCAPLUS

CN Benzenesulfonic acid, 3-[(2,5-dichlorophenyl)sulfonyl]-, 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile, 4,4'-(9H-fluoren-9-ylidene)bis[phenol] and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

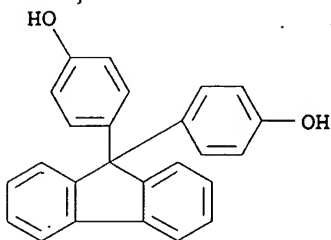
CRN 889850-42-4

CMF C17 H18 Cl2 O5 S2



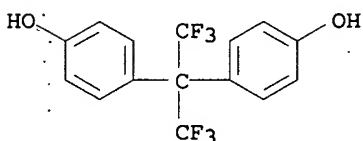
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CRN 3236-71-3  
CMF C25 H18 O2



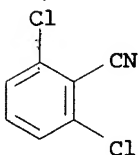
CM 3

CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 4

CRN 1194-65-6  
CMF C7 H3 Cl2 N



INCL 429033000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

IT 889850-39-9DP, hydrolyzed 889850-40-2DP,  
hydrolyzed 889850-41-3P 889850-43-5DP,  
hydrolyzed 889850-44-6DP, hydrolyzed 889850-45-7DP  
, hydrolyzed

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)  
(membrane-electrode assembly for fuel  
cell)

L15 ANSWER 4 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:558275 HCAPLUS

DOCUMENT NUMBER: 145:66263

TITLE: Membrane-electrode assembly, its manufacture,  
and fuel cell

INVENTOR(S): Adachi, Shinya; Izuhara, Daisuke; Nakamura,  
Masataka; Shimoyama, Naoki; Uete, Takao; Kidai,  
Masayuki

PATENT ASSIGNEE(S): Toray Industries, Inc., Japan

SOURCE: PCT Int. Appl., 77 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2006061993	A1	20060615	WO 2005-JP21507	20051124

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

PRIORITY APPLN. INFO.: JP 2004-353914 A 20041207  
 JP 2005-253178 A 20050901

AB The membrane-electrode assembly has an electrolyte membrane between a pair of electrodes; where a 1st layer is provided between  $\geq 1$  of the electrodes and the electrolyte membrane and a value of storage elastic modulus (C) of the electrolyte film as measured with a nano hardness meter is  $\geq 1$  GPa when the storage elastic modulus of the 1st layer is D. The assembly is manufd. by pasting  $\geq 1$  electrode to an electrolyte film via an interface resistance reducing compn. contg. a plasticizer and an ionic group-contg. polymer material and removing a part or whole part of the plasticizer from the compn. by a solvent extn. The fuel cell uses the above assembly.

IT 862772-94-9 862773-00-0

RL: DEV (Device component use); USES (Uses)  
 (structure and manuf. of **membrane-electrode** assemblies having ionic group-contg. polymer layers with controlled storage elastic modulus for **fuel cells**)

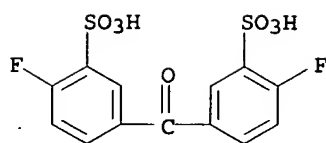
RN 862772-94-9 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt, polymer with bis(4-fluorophenyl)methanone and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 210531-45-6

CMF C13 H8 F2 O7 S2 . 2 Na

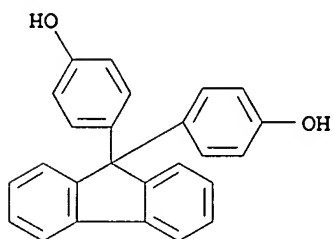


●2 Na

CM 2

CRN 3236-71-3

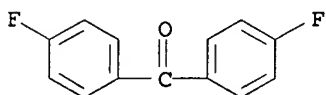
CMF C25 H18 O2



CM 3

CRN 345-92-6

CMF C13 H8 F2 O



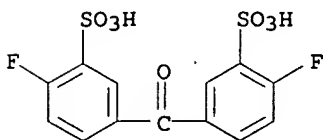
RN 862773-00-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt, polymer with bis(4-fluorophenyl)methanone and 4,4'-(diphenylmethylen)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

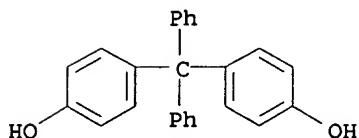
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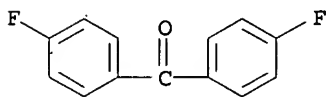


●2 Na

CM 2

CRN 1844-01-5  
CMF C25 H20 O2

CM 3

CRN 345-92-6  
CMF C13 H8 F2 OCC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
IT 7440-44-0, Carbon, uses 9002-84-0, PTFE 862772-94-9  
862773-00-0RL: DEV (Device component use); USES (Uses)  
(structure and manuf. of **membrane-electrode**  
assemblies having ionic group-contg. polymer layers with  
controlled storage elastic modulus for **fuel**  
**cells**)REFERENCE COUNT: 26 THERE ARE 26 CITED REFERENCES AVAILABLE  
FOR THIS RECORD. ALL CITATIONS AVAILABLE  
IN THE RE FORMAT

L15 ANSWER 5 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:463219 HCAPLUS

DOCUMENT NUMBER: 144:471428

TITLE: Novel membrane and membrane electrode assemblies  
for use in an electrochemical cellINVENTOR(S): Panambur, Gangadhar; Mada, Kannan Arunachala  
Nadar

PATENT ASSIGNEE(S): USA

SOURCE: U.S. Pat. Appl. Publ., 18 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2006105215	A1	20060518	US 2004-990452	20041116
WO 2006055157	A2	20060526	WO 2005-US37516	20051020

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA,  
CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,

Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM,  
KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK,  
MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO,  
RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ,  
UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW  
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU,  
IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR,  
BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD,  
TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

PRIORITY APPLN. INFO.:

US 2004-990452

A

200411  
16

AB An ion exchange membrane for use in an electrochem. cell is disclosed. The ion exchange membrane includes: (i) a first layer capable of conducting ions when placed between two electrodes of the electrochem. cell; and (ii) a second layer disposed around at least a portion of the first layer, wherein the second layer is made from a perimeter strengthening material, such that the second layer strengthens at least a portion of a perimeter boundary of the first layer. Methods for making such ion exchange membranes and methods of making membrane electrode assemblies incorporating such membranes are also described.

IT 886989-65-7P

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses).

(membrane and membrane electrode  
assemblies for use in electrochem. cell)

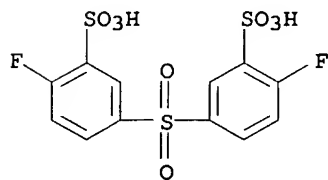
RN 886989-65-7 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, disodium salt,  
polymer with [1,1'-biphenyl]-4,4'-diol, 4,4'-(1,4-  
butanediyl)bis[phenol] and 1,1'-sulfonylbis[4-fluorobenzene] (9CI)  
(CA INDEX NAME)

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CRN 301155-59-9

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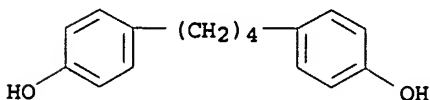


● 2 Na

CM 2

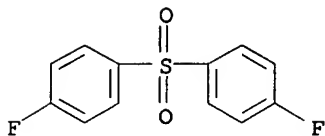
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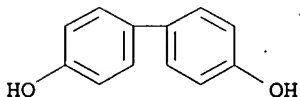
CM 3

CRN 383-29-9  
CMF C12 H8 F2 O2 S



CM 4

CRN 92-88-6  
CMF C12 H10 O2



INCL 429030000; 429033000; 521027000  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 72  
IT 886989-65-7P 886989-67-9P  
RL: DEV (Device component use); SPN (Synthetic preparation);  
PREP (Preparation); USES (Uses)  
(membrane and membrane electrode  
assemblies for use in electrochem. cell)  
IT 64-17-5, Ethanol, uses 67-56-1, Methanol, uses  
67-63-0, Isopropanol, uses 1313-13-9, Manganese dioxide, uses  
7664-38-2D, Phosphoric acid, esters 9002-84-0, Ptfе 9002-86-2,  
Polyvinyl chloride 9002-88-4, Polyethylene 9003-07-0,  
Polypropylene 9033-83-4, Poly(phenylene) 9041-80-9,  
Polyphenylene oxide 13598-36-2, Phosphonic acid 24937-79-9, Pvdф  
25190-62-9, Poly(1,4-phenylene) 31694-16-3, Peek 31833-61-1,  
Poly(sulfonyl-1,4-phenylene) 32131-17-2, Nylon 6.6, uses  
60015-03-4, Peekk 60015-05-6, Pekek 82451-55-6  
RL: MOA (Modifier or additive use); USES (Uses)  
(membrane and membrane electrode  
assemblies for use in electrochem. cell)

L15 ANSWER 6 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:363092 HCAPLUS

DOCUMENT NUMBER: 144:415901

TITLE: Sulfonaphthylene-containing poly(arylene  
ethers), their preparation, their compositions,  
ion-conducting membranes therefrom, manufacture  
thereof, and fuel cells, membrane-electrode  
assemblies, and adhesives therefrom

INVENTOR(S): Sakaguchi, Yoshimitsu; Kitamura, Kota

PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 20 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

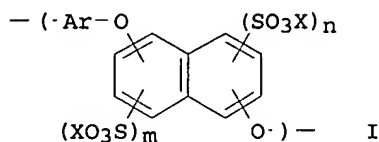
FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:



PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006104381	A2	20060420	JP 2004-295035	20041007
PRIORITY APPLN. INFO.:			JP 2004-295035	20041007

GI

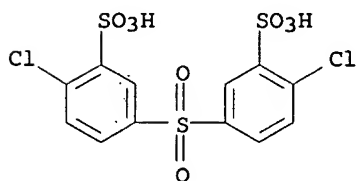


- AB The disclosed poly(arylene ethers) have I (X = H, monovalent cation; m, n = 0, 1; m + n ≠ 0; Ar = divalent arom. group) and are prepd. by nucleophilic substitution polymn. of sulfonaphthylene diols. Ion-conducting membranes from the poly(arylene ethers) or compns. contg. 50-100% of them are prepd. by casting, regulating thickness to 10-1500 μm. The membranes show good dimensional stability and are useful for membrane-electrode assemblies (MEA) of (direct methanol) fuel cells. Also claimed are adhesives from the poly(arylene ethers).
- IT 681035-31-4P, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenyl sulfone disodium salt copolymer  
 RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)  
 (compns. with sulfonaphthylene-contg. poly(arylene ethers); prepn. of sulfonaphthylene-contg. poly(arylene ethers) for fuel cell electrolytes or adhesives)
- RN 681035-31-4 HCAPLUS
- CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

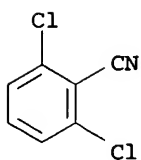
CMF C12 H8 C12 O8 S3 . 2 Na



● 2 Na

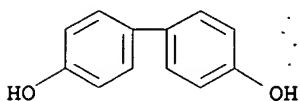
CM 2

CRN 1194-65-6  
 CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6  
 CMF C12 H10 O2



IT 883894-77-7P

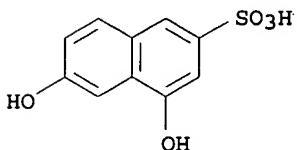
RL: DEV (Device component use); IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PYP (Physical process); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)  
 (prepn. of sulfonaphthylene-contg. poly(arylene ethers) for fuel cell electrolytes or adhesives)

RN 883894-77-7 HCAPLUS

CN 2-Naphthalenesulfonic acid, 4,6-dihydroxy-, monosodium salt, polymer with [1,1'-biphenyl]-4,4'-diol, 2,6-dichlorobenzonitrile and 3,3'-sulfonylbis[6-chlorobenzenesulfonic acid] disodium salt (9CI)  
 (CA INDEX NAME)

CM 1

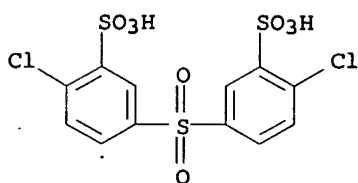
CRN 83732-66-5  
 CMF C10 H8 O5 S . Na



● Na

CM 2

CRN 51698-33-0  
 CMF C12 H8 Cl2 O8 S3 . 2 Na

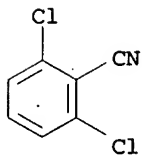


● 2 Na

CM 3

CRN 1194-65-6

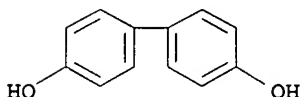
CMF C7 H3 Cl2 N



CM 4

CRN 92-88-6

CMF C12 H10 O2



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

IT 681035-31-4P, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-  
disulfo-4,4'-dichlorodiphenyl sulfone disodium salt copolymer  
883894-83-5P 883894-86-8P

RL: DEV (Device component use); IMF (Industrial manufacture); PEP  
(Physical, engineering or chemical process); PYP (Physical process);  
TEM (Technical or engineered material use); PREP  
(Preparation); PROC (Process); USES (Uses)

(compsn. with sulfonaphthylene-contg. poly(arylene ethers);  
prepn. of sulfonaphthylene-contg. poly(arylene ethers) for fuel  
cell electrolytes or adhesives)

IT 883894-77-7P 883894-80-2P 883894-89-1P

RL: DEV (Device component use); IMF (Industrial manufacture); PEP  
(Physical, engineering or chemical process); PYP (Physical process);  
TEM (Technical or engineered material use); PREP  
(Preparation); PROC (Process); USES (Uses)

(prepn. of sulfonaphthylene-contg. poly(arylene ethers) for fuel  
cell electrolytes or adhesives)

L15 ANSWER 7 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:232173 HCAPLUS

DOCUMENT NUMBER: 144:295881

TITLE: Polyelectrolytes, their membranes,  
membrane-electrode assemblies, and polymer

Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

INVENTOR(S): electrolyte fuel cells  
Izuhara, Daisuke; Shimoyama, Naoki; Nakamura,  
Masataka  
PATENT ASSIGNEE(S): Toray Industries, Inc., Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 28 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006073371	A2	20060316	JP 2004-255969	200409 02
PRIORITY APPLN. INFO.:				200409 02

AB The title polyelectrolytes consist of hydrocarbon-type polymers having ionic groups and show high flexibility under humidified conditions and low swelling in fuels, e.g., MeOH. The title assemblies using the polyelectrolyte membranes show high adhesion of electrodes and the resulting fuel cells provide low crossover of MeOH.

IT 862772-96-1P 879083-04-2P

RL: DEV (Device component use); IMF (Industrial manufacture);

PREP (Preparation); USES (Uses)

(cardo; polyelectrolytes for membrane-electrode assemblies and polymer electrolyte fuel cells)

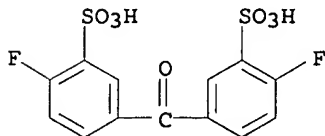
RN 862772-96-1 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt, polymer with bis(4-fluorophenyl)methanone, 4,4'-(9H-fluoren-9-ylidene)bis[phenol] and 4,4'-oxybis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 210531-45-6

CMF C13 H8 F2 O7 S2 . 2 Na

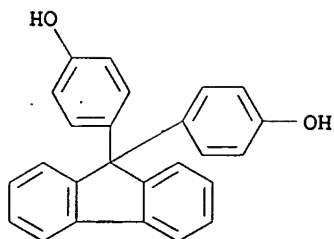


●2 Na

CM 2

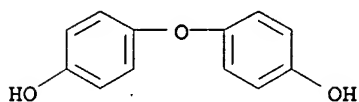
CRN 3236-71-3

CMF C25 H18 O2



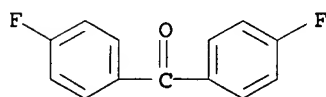
CM 3

CRN 1965-09-9  
CMF C12 H10 O3



CM 4

CRN 345-92-6  
CMF C13 H8 F2 O

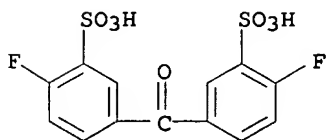


RN 879083-04-2 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt,  
polymer with [1,1'-biphenyl]-2,5-diol, bis(4-fluorophenyl)methanone  
and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

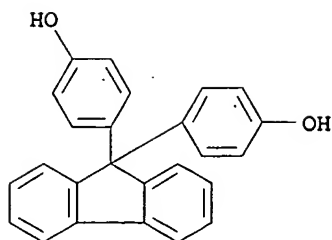
CRN 210531-45-6  
CMF C13 H8 F2 O7 S2 . 2 Na



● 2 Na

CM 2

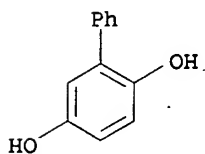
CRN 3236-71-3  
CMF C25 H18 O2



CM 3

CRN 1079-21-6

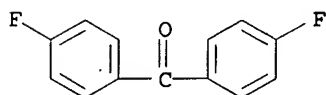
CMF C12 H10 O2



CM 4

CRN 345-92-6

CMF C13 H8 F2 O



IT 210531-45-6P

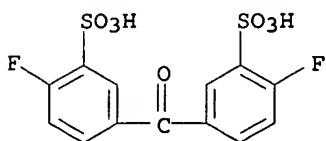
RL: IMF (Industrial manufacture); RCT (Reactant); PREP

(Preparation); RACT (Reactant or reagent)

(prepn. and polymn. of; polyelectrolytes for membrane-electrode assemblies and polymer electrolyte fuel cells)

RN 210531-45-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt (9CI) (CA INDEX NAME)



●2 Na

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

ST polymer electrolyte membrane electrode assembly  
direct methanol fuel cell

IT Fuel cells  
(polymer electrolyte, direct methanol; polyelectrolytes  
for membrane-electrode assemblies and polymer  
electrolyte fuel cells)

IT 862772-96-1P 879083-04-2P  
RL: DEV (Device component use); IMF (Industrial manufacture);  
PREP (Preparation); USES (Uses)  
(cardo; polyelectrolytes for membrane-electrode  
assemblies and polymer electrolyte fuel cells  
)

IT 345-92-6P, 4,4'-Difluorobenzophenone 210531-45-6P  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(prepn. and polymn. of; polyelectrolytes for membrane-  
electrode assemblies and polymer electrolyte fuel  
cells)

L15 ANSWER 8 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:190241 HCAPLUS

DOCUMENT NUMBER: 144:257195

TITLE: Polymeric electrolyte materials, polymeric  
electrolyte membranes, their manufacture, and  
use for membrane-electrode assemblies and  
polymer electrolyte fuel cells

INVENTOR(S): Izuhara, Daisuke; Kondo, Akiko; Nakamura,  
Masataka

PATENT ASSIGNEE(S): Toray Industries, Inc., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 31 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006059694	A2	20060302	JP 2004-240922	200408 20
PRIORITY APPLN. INFO.:				JP 2004-240922
				200408 20

AB The polymeric electrolyte materials are obtained from  
hydrocarbon-based polymers having ionic groups and crosslinkable  
compds. having groups CH<sub>2</sub>OR<sub>1</sub> (R<sub>1</sub> = H, org. group) and show haze  
≤30% in hydrated states. Coating solns. contg. the  
hydrocarbon-based polymers having ionic groups and the crosslinkable  
compds. above are poured and crosslinked to give the polymeric  
electrolyte membranes useful for membrane-electrode assemblies (MEA)  
and polymer electrolyte fuel cells. Thus, a soln. contg.  
4,4'-(9H-fluoren-9-ylidene)bisphenol-4,4'-difluorobenzophenone-  
disodium 3,3'-disulfonate-4,4'-difluorobenzophenone copolymer  
(prepn. given) and HMOM-TPPHBA (OH- and MeOCH<sub>2</sub>-contg. crosslinkable  
compd.) was poured onto a glass substrate, dried, heat-treated, and  
protonated by immersion in 1N HCl to give a polymeric electrolyte  
membrane showing good proton cond. and low MeOH crossover. MEA  
using the polymeric electrolyte membrane showed output power  
2.0-fold and energy capacity 2.9-fold those of a control using a  
Nafion 117 membrane.

IT 877224-19-6DP, protonated 877224-21-0DP,  
protonated  
RL: DEV (Device component use); IMF (Industrial manufacture); TEM

(Technical or engineered material use); PREP (Preparation)

; USES (Uses)

(ionic group-contg. polymeric electrolyte materials and membranes with high proton cond. and low fuel crossover for membrane-electrode assemblies and polymer electrolyte fuel cells)

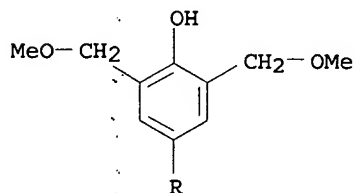
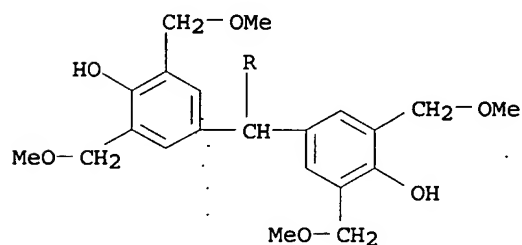
RN 877224-19-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt, polymer with bis(4-fluorophenyl)methanone, 4,4'-(9H-fluoren-9-ylidene)bis[phenol] and 4,4',4''-methylidynetris[2,6-bis(methoxymethyl)phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 877224-17-4

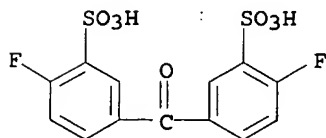
CMF C31 H40 O9



CM 2

CRN 210531-45-6

CMF C13 H8 F2 O7 S2 . 2 Na



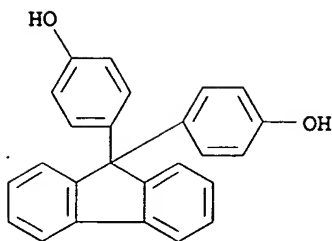
●2 Na

CM 3

CRN 3236-71-3

CMF C25 H18 O2

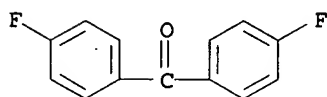




CM 4

CRN 345-92-6

CMF C13 H8 F2 O



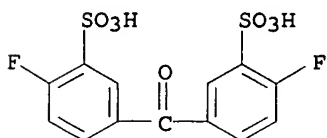
RN 877224-21-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt, polymer with bis(4-fluorophenyl)methanone, 4,4'-(9H-fluoren-9-ylidene)bis[phenol] and 5,5'-(1-methylethylidene)bis[2-hydroxy-1,3-benzenedimethanol] (9CI) (CA INDEX NAME)

CM 1

CRN 210531-45-6

CMF C13 H8 F2 O7 S2 . 2 Na

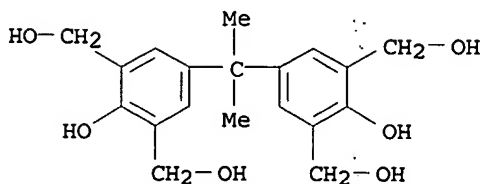


● 2 Na

CM 2

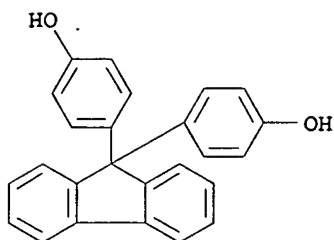
CRN 3957-22-0

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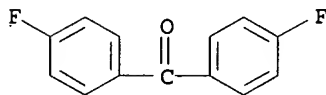
CM 3

CRN 3236-71-3  
CMF C25 H18 O2



CM 4

CRN 345-92-6  
CMF C13 H8 F2 O



IT 210531-45-6P 862772-94-9P

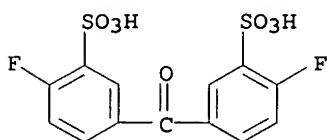
RL: IMF (Industrial manufacture); RCT (Reactant); PREP

(Preparation); RACT (Reactant or reagent)

(ionic group-contg. polymeric electrolyte materials and membranes with high proton cond. and low fuel crossover for membrane-electrode assemblies and polymer electrolyte fuel cells)

RN 210531-45-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt (9CI) (CA INDEX NAME)



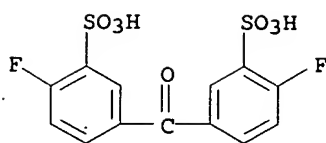
●2 Na

RN 862772-94-9 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, disodium salt, polymer with bis(4-fluorophenyl)methanone and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

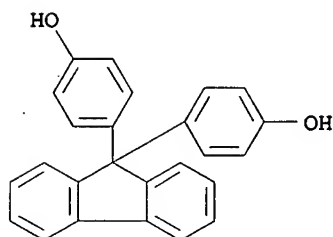
CRN 210531-45-6  
CMF C13 H8 F2 O7 S2 . 2 Na



●2 Na

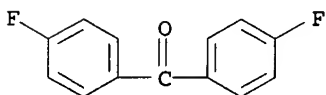
CM 2

CRN 3236-71-3  
CMF C25 H18 O2



CM 3

CRN 345-92-6  
CMF C13 H8 F2 O



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 37, 38, 76

IT 877224-19-6DP, protonated 877224-21-0DP,  
protonated

RL: DEV (Device component use); IMF (Industrial manufacture); TEM  
(Technical or engineered material use); PREP (Preparation)  
; USES (Uses)

(ionic group-contg. polymeric electrolyte materials and membranes  
with high proton cond. and low fuel crossover for  
membrane-electrode assemblies and polymer  
electrolyte fuel cells)

IT 210531-45-6P 862772-94-9P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)

(ionic group-contg. polymeric electrolyte materials and membranes  
with high proton cond. and low fuel crossover for  
membrane-electrode assemblies and polymer  
electrolyte fuel cells)

L15 ANSWER 9 OF 34 HCAPLUS .COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:170084 HCAPLUS

DOCUMENT NUMBER: 144:216119

Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

TITLE: Multilayer electrolyte membranes including hydrocarbon polymers, membrane-electrode assemblies, method for their manufacture, and fuel cells

INVENTOR(S): Kubota, Yasuo; Ueshima, Koichi; Takeda, Shinji; Tachiki, Hideyasu; Sasaki, Shoichi; Sonobe, Hiroyuki

PATENT ASSIGNEE(S): Hitachi Chemical Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 26 pp.  
CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006054080	A2	20060223	JP 2004-233511	20040810
PRIORITY APPLN. INFO.:				JP 2004-233511
				20040810

AB The title multilayered electrolyte membranes comprise  $\geq 2$  layers of hydrocarbon polymer electrolytes contg. acid-generating group(s), and the layers show different polymer ion exchange capacities. The membranes are manufd. by alternate lamination of the polymers. **Membrane-electrode** assemblies including the membranes, fuel cells using the assemblies, and their manuf. are also claimed. The membranes show prevented permeation of H gas and methanol.

IT 875640-02-1P  
RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(manuf. of hydrocarbon polyelectrolyte laminates for **membrane-electrode assemblies in fuel cells**)

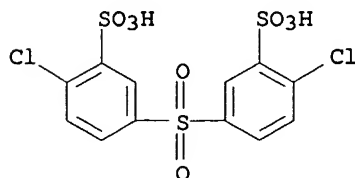
RN 875640-02-1 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with 4,4'-oxybis[phenol] and 1,1'-sulfonylbis[4-chlorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

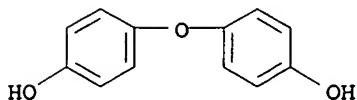
CMF C12 H8 C12 O8 S3 . 2 Na



● 2 Na

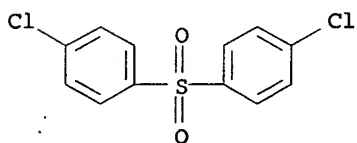
CM 2

CRN 1965-09-9  
CMF C12 H10 O3



CM 3

CRN 80-07-9  
CMF C12 H8 C12 O2 S

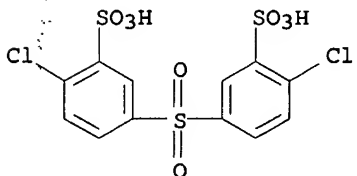


IT 51698-33-0P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(manuf. of hydrocarbon polyelectrolyte laminates for membrane-electrode assemblies in fuel cells)

RN 51698-33-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt (9CI) (CA INDEX NAME)



●2 Na

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

IT 875640-02-1P

RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(manuf. of hydrocarbon polyelectrolyte laminates for membrane-electrode assemblies in fuel cells)

IT 51698-33-0P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(manuf. of hydrocarbon polyelectrolyte laminates for membrane-electrode assemblies in fuel cells)

L15 ANSWER 10 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2006:100085 HCAPLUS  
 DOCUMENT NUMBER: 144:174295  
 TITLE: Polymer electrolyte membrane containing  
 hydroxides, membrane-electrode  
 assembly, its manufacture, and direct  
 methanol fuel cell using it with  
 suppressed methanol crossover  
 INVENTOR(S): Sasaki, Shoichi; Ueshima, Koichi; Sonobe,  
 Hiroyuki  
 PATENT ASSIGNEE(S): Hitachi Chemical Co., Ltd., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 27 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

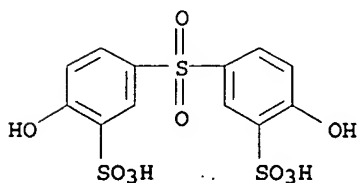
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006031970	A2	20060202	JP 2004-204909	200407 12
PRIORITY APPLN. INFO.:			JP 2004-204909	200407 12

AB The membrane comprises polymers having acid-forming groups and  
 compds. having OH. The electrolyte membrane, useful for direct  
 methanol fuel cell (DMFC), shows high proton cond. and MeOH  
 impermeability.  
 IT 866552-08-1P 874358-71-1P  
 RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM  
 (Technical or engineered material use); PREP (Preparation)  
 ; USES (Uses)  
 (polymer electrolyte membrane contg. hydroxides for direct  
 methanol fuel cells with suppressed MeOH crossover)  
 RN 866552-08-1 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-hydroxy-, disodium salt,  
 polymer with 4,4'-oxybis[phenol] and 1,1'-sulfonylbis[4-  
 chlorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 53819-45-7

CMF C12 H10 O10 S3 . 2 Na

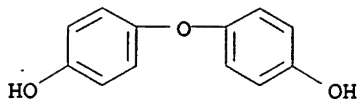


● 2 Na

CM 2

CRN 1965-09-9

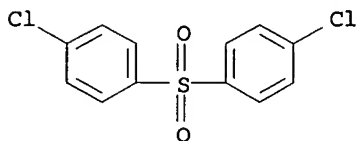
CMF C12 H10 O3



CM 3

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



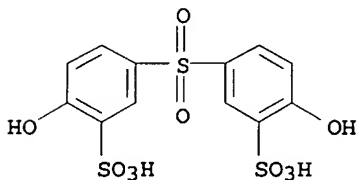
RN 874358-71-1 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-hydroxy-, disodium salt,  
polymer with 2,6-naphthalenediol and 1,1'-sulfonylbis[4-  
chlorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 53819-45-7

CMF C12 H10 O10 S3 . 2 Na

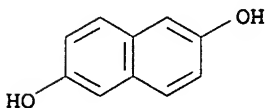


●2 Na

CM 2

CRN 581-43-1

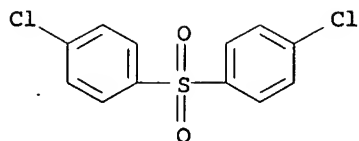
CMF C10 H8 O2



CM 3

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



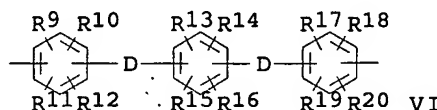
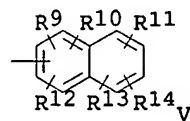
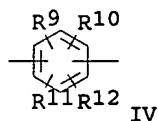
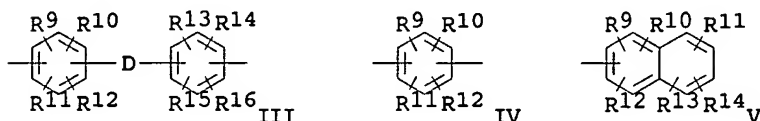
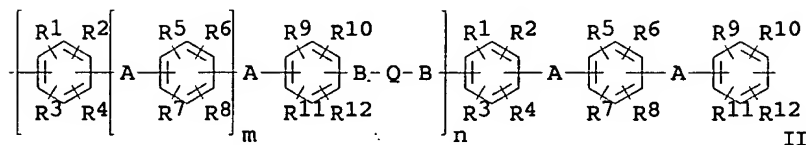
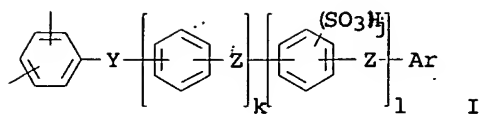
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
IT 866552-08-1P 874358-71-1P  
RL: IMF (Industrial manufacture); POF (Polymer in formulation); TEM  
(Technical or engineered material use); PREP (Preparation)  
; USES (Uses)  
(polymer electrolyte membrane contg. hydroxides for direct  
methanol fuel cells with suppressed MeOH crossover)

L15 ANSWER 11 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 2006:100032 HCAPLUS  
DOCUMENT NUMBER: 144:153502  
TITLE: Electrolyte membrane-electrode assembly for  
polymer electrolyte fuel cell and the fuel cell  
INVENTOR(S): Kanaoka, Osayuki; Iguchi, Masaru; Soma, Hiroshi  
PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 40 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2006032182	A2	20060202	JP 2004-210956	200407 20
PRIORITY APPLN. INFO.:			JP 2004-210956	200407 20

GI





AB The electrolyte membrane in the assembly is an arylene copolymer contg. structure units I (Y = bivalent electron withdrawing group, Z = bivalent electron donating group or a single bond, Ar = SO<sub>3</sub>H group contg. arom. group, k = integer 0-10, l = integer 0-10, j = integer 1-4) and II (A = bivalent electron withdrawing group or a single bond; B = O or S; R<sub>1</sub>-R<sub>12</sub> = H, F, or alkyl group; m = integer ≥ 1, n = integer ≥ 2, Q contains III, IV, V, and/or VI (D = bivalent atom or org. group or single bond, R<sub>9</sub>-R<sub>20</sub> = H, F, alkyl or aryl group).

IT 874121-32-1 874121-34-3

RL: DEV (Device component use); USES (Uses)  
(structure of polyarylene sulfonic acid electrolyte for electrolyte membrane-electrode assemblies for fuel cells)

RN 874121-32-1 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, polymer with α-[4-[4-(4-chlorobenzoyl)benzoyl]phenyl]-ω-chloropoly[oxy-1,4-phenylene[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylenecarbonyl-1,4-phenylene] (9CI) (CA INDEX NAME)

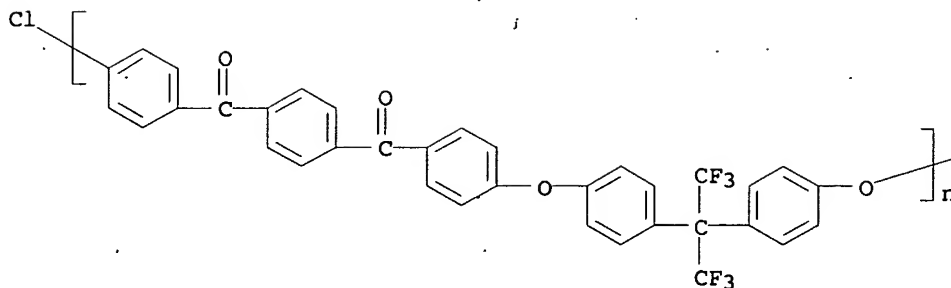
CM 1

CRN 874121-31-0

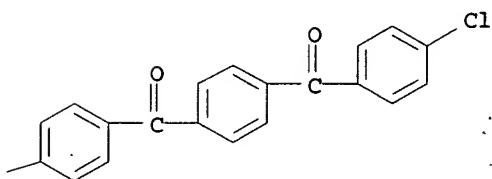
CMF (C35 H20 F6 O4)<sub>n</sub> C20 H12 Cl2 O2

CCI PMS

PAGE 1-A



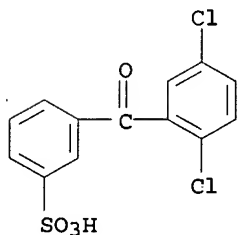
PAGE 1-B



CM 2

CRN 873815-38-4

CMF C13 H8 Cl2 O4 S



RN 874121-34-3 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, polymer with  
 $\alpha$ -[4-[3-(4-chlorobenzoyl)benzoyl]phenyl]- $\omega$ -  
 chloropoly[oxy-1,4-phenylene[2,2,2-trifluoro-1-  
 (trifluoromethyl)ethylidene]-1,4-phenyleneoxy-1,4-phenylenecarbonyl-  
 1,3-phenylenecarbonyl-1,4-phenylene] (9CI) (CA INDEX NAME)

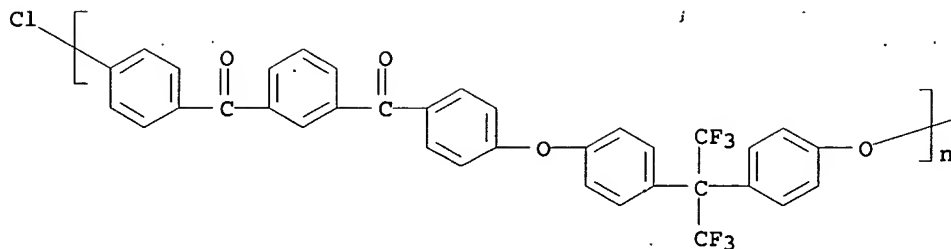
CM 1

CRN 874121-33-2

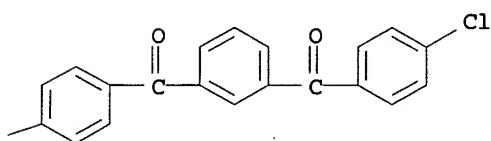
CMF (C35 H20 F6 O4)<sub>n</sub> C20 H12 Cl2 O2

CCI PMS

PAGE 1-A



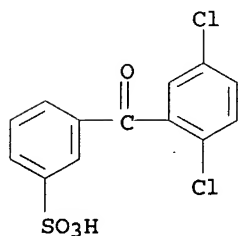
PAGE 1-B



CM 2

CRN 873815-38-4

CMF C13 H8 Cl2 O4 S



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 874121-32-1 874121-34-3

RL: DEV (Device component use); USES (Uses)

(structure of polyarylene sulfonic acid electrolyte for electrolyte membrane-electrode assemblies for fuel cells)

L15 ANSWER 12 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:99962 HCAPLUS

DOCUMENT NUMBER: 144:195244

TITLE: Electrolyte membrane-electrode assembly for polymer electrolyte fuel cell and the fuel cell

INVENTOR(S): Kanaoka, Osayuki; Iguchi, Masaru; Soma, Hiroshi

PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 42 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

JP 2006032179

A2

20060202

JP 2004-210953

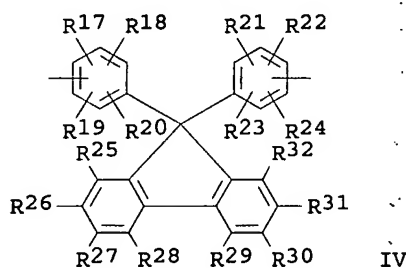
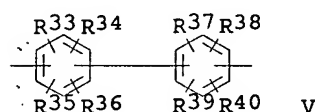
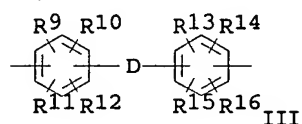
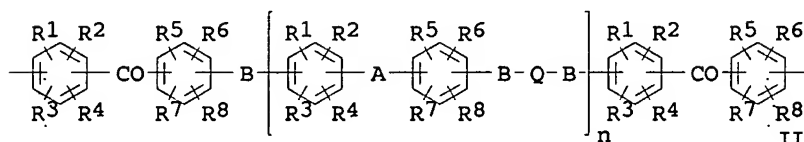
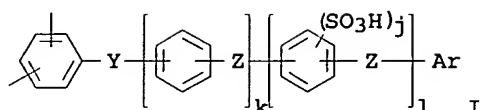
200407  
20

PRIORITY APPLN. INFO.:

JP 2004-210953

200407  
20

GI



AB The electrolyte membrane-electrode assembly has a polymer electrolyte membrane between a pair of catalytic electrodes, where the electrolyte membrane has structure units I (Y = bivalent electron withdrawing group, Z = bivalent electron donating group or a single bond, Ar = SO<sub>3</sub>H group contg. arom. group, k = integer 0-10, l = integer 0-10, j = integer 1-4) and II [A = bivalent atom or org. group other than carbonyl group or a single bond, B = O or S, R1-8 = H, F, or alkyl group, n = integer, Q contains 20-99 mol% III (D = bivalent atom or org. group, R9-16 = H, F, alkyl or aryl group) and 1-20 mol% IV and V (R17-40 = H, F, alkyl or aryl group)].

IT 873815-39-5 873815-40-8

RL: DEV (Device component use); USES (Uses)

(structure of polyarylene sulfonic acid electrolyte for electrolyte membrane-electrode assemblies for fuel cells)

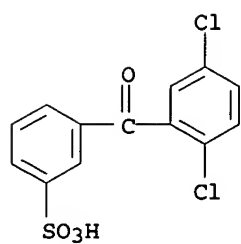
RN 873815-39-5 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, polymer with bis(4-chlorophenyl)methanone, 4,4'-(9H-fluoren-9-ylidene)bis[phenol], 1,1'-sulfonylbis[4-chlorobenzene] and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 873815-38-4

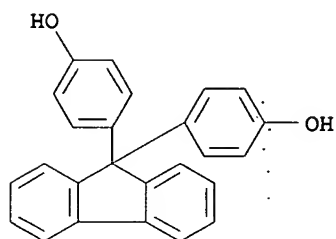
CMF C13 H8 Cl2 O4 S



CM 2

CRN 3236-71-3

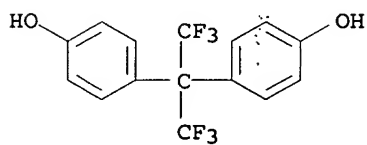
CMF C25 H18 O2



CM 3

CRN 1478-61-1

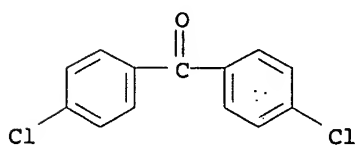
CMF C15 H10 F6 O2



CM 4

CRN 90-98-2

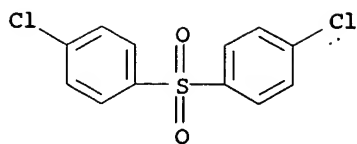
CMF C13 H8 Cl2 O



CM 5

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



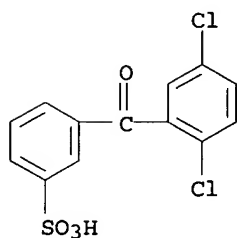
RN 873815-40-8 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, polymer with [1,1'-biphenyl]-4,4'-diol, bis(4-chlorophenyl)methanone, 1,1'-sulfonylbis[4-chlorobenzene] and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 873815-38-4

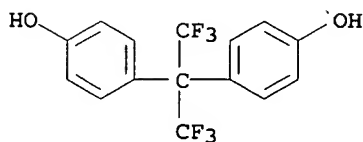
CMF C13 H8 Cl2 O4 S



CM 2

CRN 1478-61-1

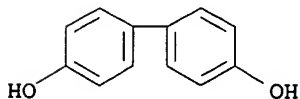
CMF C15 H10 F6 O2



CM 3

CRN 92-88-6

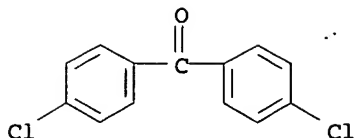
CMF C12 H10 O2



CM 4

CRN 90-98-2

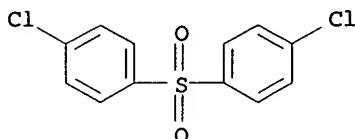
CMF C13 H8 Cl2 O



CM 5

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 873815-39-5 873815-40-8

RL: DEV (Device component use); USES (Uses)

(structure of polyarylene sulfonic acid electrolyte for  
electrolyte membrane-electrode assemblies for  
fuel cells)

L15 ANSWER 13 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2006:69864 HCAPLUS

DOCUMENT NUMBER: 144:174236

TITLE: Membrane-electrode structure for solid polymer fuel cell

INVENTOR(S): Kanaoka, Nagayuki; Iguchi, Masaru; Sohma, Hiroshi

PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan

SOURCE: Eur. Pat. Appl., 31 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

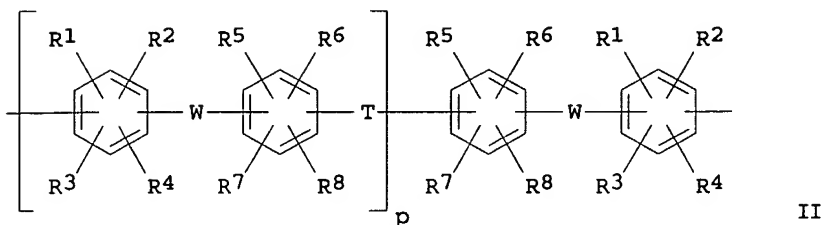
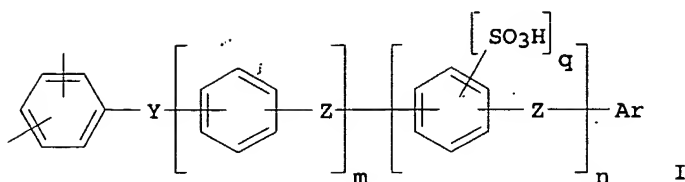
LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1619739	A2	20060125	EP 2005-15000	20050711
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, BA, HR, IS, YU				
JP 2006032180	A2	20060202	JP 2004-210954	20040720
PRIORITY APPLN. INFO.:			JP 2004-210954	A 20040720

GI



AB A membrane-electrode structure for a solid polymer fuel cell excellent in power generation performance and durability and a solid polymer fuel cell comprising the membrane-electrode structure are provided. In the membrane-electrode structure for a solid polymer fuel cell in which the polymer electrolyte membrane is sandwiched between a pair of electrodes contg. a catalyst, the polymer electrolyte membrane comprises a constituent unit which has an ion conductive moiety consisting of a sulfonic acid group and is represented by the general formula (I) and a constituent unit consisting only of a non-ion conductive moiety which has a no. av. mol. wt. in the range of 1000 to 12,000 measured by gel permeation chromatog. and is represented by the general formula (II). The above-mentioned copolymer is a block copolymer in which the constituent units are covalently bonded. The solid polymer fuel cell comprises the above-mentioned membrane-electrode structure for a solid polymer fuel cell. In I, Y represents a divalent electron withdrawing group; Z represents a divalent electron donating group or a direct bond; Ar represents an arom. group having a substituent represented by -SO<sub>3</sub>H; m represents an integer of 0 to 10; n represents an integer of 0 to 10; and q represents an integer of 1 to 4. In II, R<sub>1</sub> to R<sub>8</sub>, which may be the same or different, each represent at least one atom or group selected from the group consisting of a hydrogen atom, a fluorine atom, an alkyl group, a fluorine substituted alkyl group, an allyl group, an aryl group and a cyano group; W represents a divalent electron withdrawing group or a single bond; T represents a single bond or a divalent org. group and p represents 0 or a pos. integer.

IT 663920-28-3DP, hydrolyzed

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)

(membrane-electrode structure for solid polymer fuel cell)

RN 663920-28-3 HCAPLUS

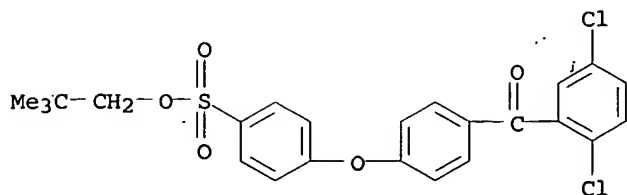
CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 663920-26-1

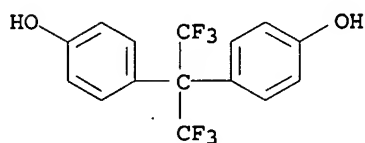
CMF C24 H22 Cl2 O5 S





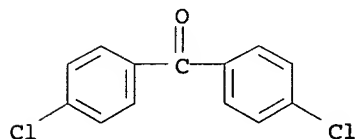
CM 2

CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2  
CMF C13 H8 Cl2 O



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
IT 663920-28-3DP, hydrolyzed  
RL: DEV (Device component use); SPN (Synthetic preparation);  
PREP (Preparation); USES (Uses)  
(membrane-electrode structure for solid  
polymer fuel cell)

L15 ANSWER 14 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 2005:1176409 HCAPLUS  
DOCUMENT NUMBER: 143:408270  
TITLE: Manufacture of proton-conductive porous  
membranes for fabrication of membrane-electrode  
assemblies  
INVENTOR(S): Kawai, Junji; Goto, Kohei; Kanaoka, Osayuki;  
Asano, Yoichi; Takahashi, Ryoichiro; Iguchi,  
Masaru  
PATENT ASSIGNEE(S): Jsr Ltd., Japan; Honda Motor Co., Ltd.  
SOURCE: Jpn. Kokai Tokkyo Koho, 35 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005310643	A2	20051104	JP 2004-128245	20040423
PRIORITY APPLN. INFO.:			JP 2004-128245	20040423

AB The membranes, comprising ion-conducting component-contg. arom. polymers, show porosity 1-60%. The membranes are manufd. by dissolving the polymers in casting solvents, applying the solns. on substrates to form thin membranes contg. 10-95% of the casting solvents, and brining the membranes in contact with poor solvents having compatibility with the casting solvents. The membranes show high protonic cond. and good mech. properties, and are useful for fuel cells.

IT 852156-73-1DP, 2,2-Bis (4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-4,4'-dichlorobenzophenone-neopentyl 4-[4-(2,5-dichlorobenzoyl)phenoxy]benzenesulfonate block copolymer, hydrolyzed

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(manuf. of proton-conductive porous membranes for membrane-electrode assemblies)

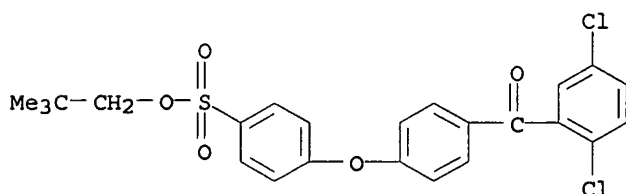
RN 852156-73-1 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

CRN 663920-26-1

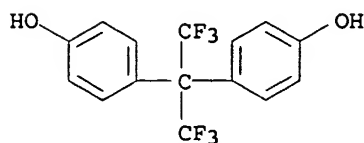
CMF C24 H22 Cl2 O5 S



CM 2

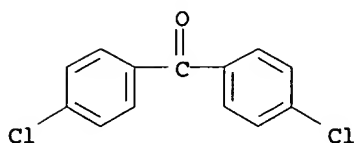
CRN 1478-61-1

CMF C15 H10 F6 O2



CM 3

CRN 90-98-2  
CMF C13 H8 Cl2 O



IC ICM H01M008-02  
ICS H01B001-06; H01B013-00; H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 76  
IT 67-56-1, Methanol, uses 872-50-4, N-Methyl-2-pyrrolidone, uses  
RL: NUU (Other use, unclassified); USES (Uses)  
(casting solvent; manuf. of proton-conductive porous membranes for membrane-electrode assemblies)  
IT 852156-73-1DP, 2,2-Bis (4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-4,4'-dichlorobenzophenone-neopentyl 4-[4-(2,5-dichlorobenzoyl)phenoxy]benzenesulfonate block copolymer, hydrolyzed  
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(manuf. of proton-conductive porous membranes for membrane-electrode assemblies)

L15 ANSWER 15 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 2005:1074866 HCAPLUS  
DOCUMENT NUMBER: 143:369984  
TITLE: Manufacture of membrane-electrode assemblies by ion implantation for polymer electrolyte fuel cells  
INVENTOR(S): Kawakami, Hiroyoshi; Okuyama, Yosuke; Nakano, Takahiko  
PATENT ASSIGNEE(S): Japan Science and Technology Agency, Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 12 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005276642	A2	20051006	JP 2004-88683	20040325
PRIORITY APPLN. INFO.:				20040325

AB The assemblies contain implanted Pt ion on surfaces of polymer electrolyte membranes. The assemblies contain suppressed amt. of Pt with improved catalytic efficiency.  
IT 866111-13-9P, 2,2'-Benzidinedisulfonic acid-2,2'-diaminodiphenylhexafluoropropane-1,4,5,8-tetracarboxylic dianhydride copolymer triethylamine salt  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
(manuf. of membrane-electrode assemblies by

ion implantation for polymer electrolyte fuel  
cells)

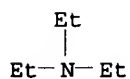
RN 866111-13-9 HCAPLUS

CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino-, polymer with  
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
2,2'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[benzenamine]  
, compd. with N,N-diethylethanamine (9CI) (CA INDEX NAME)

CM 1

CRN 121-44-8

CMF C6 H15 N



CM 2

CRN 866111-12-8

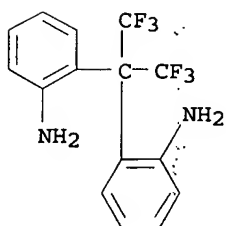
CMF (C15 H12 F6 N2 . C14 H4 O6 . C12 H12 N2 O6 S2)x

CCI PMS

CM 3

CRN 866111-11-7

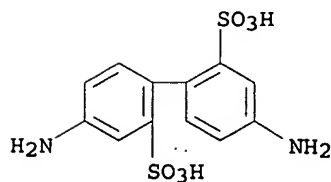
CMF C15 H12 F6 N2



CM 4

CRN 117-61-3

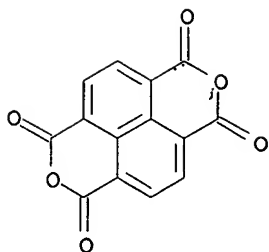
CMF C12 H12 N2 O6 S2



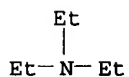
CM 5

CRN 81-30-1

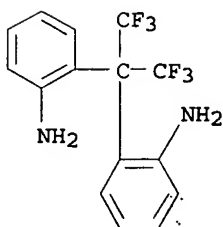
CMF C14 H4 O6



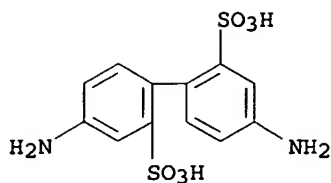
IT 866111-13-9DP, amine-removed, surface-carbonized  
 RL: DEV (Device component use); IMF (Industrial manufacture);  
 PREP (Preparation); USES (Uses)  
 (polymer electrolyte membrane; manuf. of membrane-  
 electrode assemblies by ion implantation for polymer  
 electrolyte fuel cells)  
 RN 866111-13-9 HCAPLUS  
 CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino-, polymer with  
 [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
 2,2'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[benzenamine]  
 , compd. with N,N-diethylethanamine (9CI) (CA INDEX NAME)  
 CM 1  
 CRN 121-44-8  
 CMF C6 H15 N



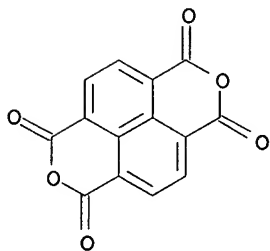
CM 2  
 CRN 866111-12-8  
 CMF (C15 H12 F6 N2 . C14 H4 O6 . C12 H12 N2 O6 S2)x  
 CCI PMS  
 CM 3  
 CRN 866111-11-7  
 CMF C15 H12 F6 N2



CM 4  
 CRN 117-61-3  
 CMF C12 H12 N2 O6 S2



CM 5

CRN 81-30-1  
CMF C14 H4 O6

IC ICM H01M008-02  
ICS C08G073-10; H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
IT 866111-13-9P, 2,2'-Benzidinedisulfonic acid-2,2'-diaminodiphenylhexafluoropropane-1,4,5,8-tetracarboxylic dianhydride copolymer triethylamine salt  
RL: IMF (Industrial manufacture); RCT (Reactant); **PREP (Preparation)**; RACT (Reactant or reagent)  
(manuf. of **membrane-electrode** assemblies by ion implantation for polymer electrolyte fuel cells)  
IT 866111-13-9DP, amine-removed, surface-carbonized  
RL: DEV (Device component use); IMF (Industrial manufacture); **PREP (Preparation)**; USES (Uses)  
(polymer electrolyte membrane; manuf. of **membrane-electrode** assemblies by ion implantation for polymer electrolyte fuel cells)

L15 ANSWER 16 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:1074843 HCAPLUS

DOCUMENT NUMBER: 143:369981

TITLE: Manufacture of electrolyte membrane-electrode assembly

INVENTOR(S): Yoshii, Kimihiko; Komatsu, Satoshi; Kawai, Junji; Kanaoka, Osayuki; Iguchi, Masaru; Soma, Hiroshi; Mitsuda, Naoki

PATENT ASSIGNEE(S): JSR Ltd., Japan; Honda Motor Co., Ltd.

SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

JP 2005276599

A2

20051006

JP 2004-87511

200403

24

PRIORITY APPLN. INFO.:

JP 2004-87511

200403

24

AB The assembly is manufd. by bonding a pair of electrodes, which comprise a gas diffusion layer and a catalyst layer, on both sides of a solid electrolyte membrane by hot pressing to have the catalyst layer side contacting the electrolyte membrane; where the water content of the electrolyte membrane is 20-70 % of the dry wt. of the electrolyte membrane during the hot pressing process.

IT 663920-28-3DP, hydrolyzed

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)

(manuf. of electrolyte membrane-electrode

assemblies using hot pressing for fuel cells)

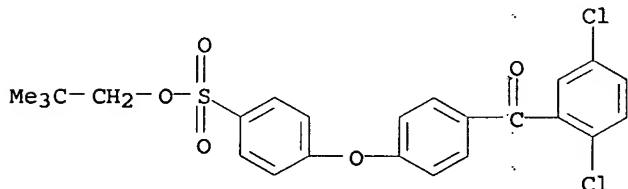
RN 663920-28-3 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethyldiene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 663920-26-1

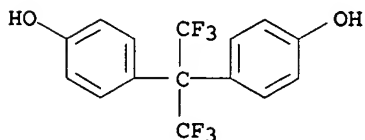
CMF C24 H22 Cl2 O5 S



CM 2

CRN 1478-61-1

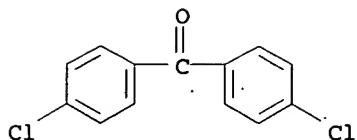
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M008-02  
ICS H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
IT 663920-28-3DP, hydrolyzed  
RL: DEV (Device component use); SPN (Synthetic preparation);  
PREP (Preparation); USES (Uses)  
(manuf. of electrolyte membrane-electrode  
assemblies using hot pressing for fuel cells)

L15 ANSWER 17 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:983088 HCAPLUS

DOCUMENT NUMBER: 143:251070

TITLE: Ion-exchange membranes for  
membrane-electrode assemblies  
of direct methanol fuel cells

INVENTOR(S): Kitamura, Kota; Sakaguchi, Yoshimitsu;  
Yamashita, Masahiro

PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 16 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005243382	A2	20050908	JP 2004-50747	200402 26
PRIORITY APPLN. INFO.:				200402 26

AB The membranes satisfy  $M \leq 3.0$ ,  $C < (0.065 + I3)$ ,  $\sigma \geq (0.02 + I3)$ , and  $I = 1-2.3$  [ $M$  = methanol permeation rate (mmol.m-2.sec-1);  $C$  = methanol permeation coeff. (mmol.m-1.sec-1) of aq. 5 mol/L methanol soln.;  $I$  = ion-exchange capacity (meq/g);  $\sigma$  = protonic cond. at 80° and relative humidity 95% (S/cm)]. The fuel cells show high discharge voltage at high methanol content.

IT 681035-31-4P, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenylsulfone disodium salt copolymer  
RL: DEV (Device component use); IMF (Industrial manufacture);  
PREP (Preparation); USES (Uses)

(ion-exchange membranes for membrane-electrode assemblies of direct methanol fuel cells)

RN 681035-31-4 HCAPLUS

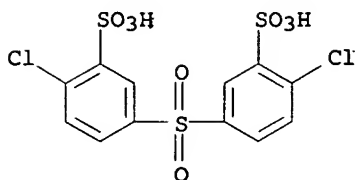
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

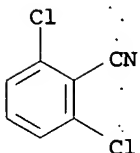


CMF C12 H8 Cl2 O8 S3 . 2 Na

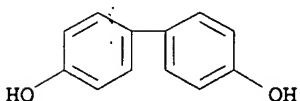


● 2 Na

CM 2

CRN 1194-65-6  
CMF C7 H3 Cl2 N

CM 3

CRN 92-88-6  
CMF C12 H10 O2

- IC ICM H01M008-02  
ICS B01J039-18; B01J047-12; H01M008-10; H01B001-06
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- ST ion exchange membrane electrode assembly fuel  
cell; polyarylene polyether electrolyte direct methanol  
fuel cell; biphenol dichlorobenzonitrile  
disulfodichlorodiphenylsulfone disodium polymer electrolyte
- IT Fuel cell electrodes  
Fuel cell electrolytes  
Fuel cells  
Ion exchange membranes  
(ion-exchange membranes for membrane-  
electrode assemblies of direct methanol fuel  
cells)
- IT Polysulfones, uses  
RL: DEV (Device component use); IMF (Industrial manufacture); PREP  
(Preparation); USES (Uses)  
(polyarylene-polyether-; ion-exchange membranes for  
membrane-electrode assemblies of direct  
methanol fuel cells)
- IT Polyethers, uses

RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(polyarylene-polysulfone-; ion-exchange membranes for membrane-electrode assemblies of direct methanol fuel cells)

IT 681035-31-4P, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenylsulfone disodium salt copolymer  
 RL: DEV (Device component use); IMF (Industrial manufacture);  
 PREP (Preparation); USES (Uses)  
 (ion-exchange membranes for membrane-electrode assemblies of direct methanol fuel cells)

L15 ANSWER 18 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:982668 HCAPLUS

DOCUMENT NUMBER: 143:289410

TITLE: Sulfo-containing polymers, and their use in polymer compositions, ion-exchange resins, ion-exchange membranes, membrane/electrode assemblies, and fuel cells

INVENTOR(S): Kitamura, Kota; Sakaguchi, Yoshimitsu

PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 17 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

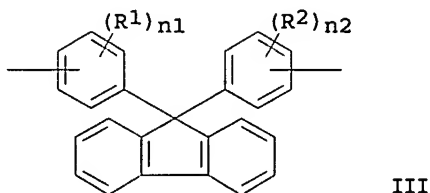
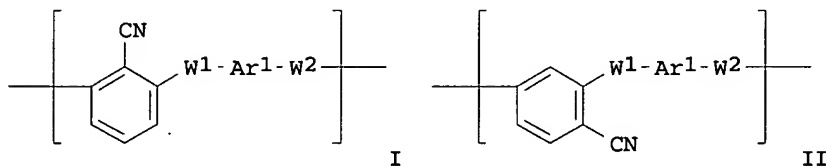
LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005239849	A2	20050908	JP 2004-50748	20040226
PRIORITY APPLN. INFO.: JP 2004-50748				20040226

GI



AB The polymers have structural repeating units of I or II [W1, W2 = S, O; Ar1 = III; R1, R2 = H, C1-4 alkyl; n1, n2 = 0-2]. The ion-exchange membranes contg. the polymers show low permeability of MeOH fuels.

IT 864062-86-2DP, hydrolyzed 864062-87-3DP,  
hydrolyzed

RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(sulfo-contg. cardo polymers for ion-exchange resins,  
ion-exchange membranes, membrane/  
electrode assemblies, and fuel cells)

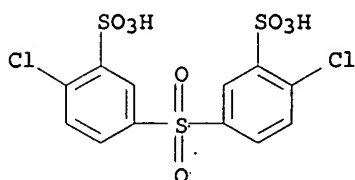
RN 864062-86-2 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
polymer with 2,6-dichlorobenzonitrile and 4,4'-(9H-fluoren-9-  
ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

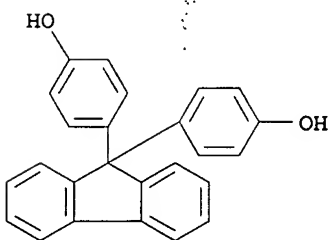


●2 Na

CM 2

CRN 3236-71-3

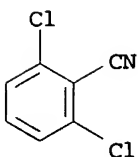
CMF C25 H18 O2



CM 3

CRN 1194-65-6

CMF C7 H3 Cl2 N



RN 864062-87-3 HCAPLUS

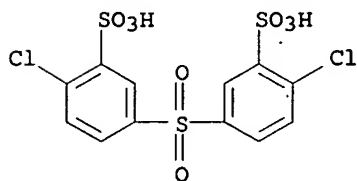
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,

polymer with [1,1'-biphenyl]-4,4'-diol, 2,6-dichlorobenzonitrile and 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

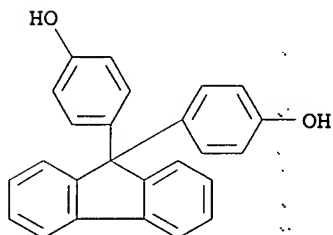


●2 Na

CM 2

CRN 3236-71-3

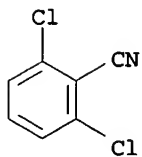
CMF C25 H18 O2



CM 3

CRN 1194-65-6

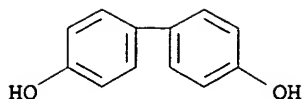
CMF C7 H3 Cl2 N



CM 4

CRN 92-88-6

CMF C12 H10 O2



IC ICM C08G061-12  
ICS C08J005-22; H01B001-06; H01M008-02; H01M008-10; C08L065-00  
CC 52-2. (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 48  
IT 864062-86-2DP, hydrolyzed 864062-87-3DP,  
hydrolyzed  
RL: IMF (Industrial manufacture); TEM (Technical or engineered  
material use); PREP (Preparation); USES (Uses)  
(sulfo-contg. cardo polymers for ion-exchange resins,  
ion-exchange membranes, membrane/  
electrode assemblies, and fuel cells)

L15 ANSWER 19 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
ACCESSION NUMBER: 2005:979167 HCAPLUS  
DOCUMENT NUMBER: 143:249476  
TITLE: Ion-conducting polymers, their manufacture, and  
their uses  
INVENTOR(S): Sakaguchi, Yoshimitsu; Kitamura, Kota  
PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 16 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005239850	A2	20050908	JP 2004-50752	200402 26
PRIORITY APPLN. INFO.:			JP 2004-50752	200402 26

AB The polymers with high proton cond., heat resistance,  
processability, and dimensional stability and low MeOH permeability,  
have arom. main chains with SO<sub>2</sub>H and/or its deriv. groups and CO<sub>2</sub>H  
and/or its their deriv. groups. The polymers are manufd. by  
treating polymers having structural units C<sub>6</sub>H<sub>3</sub>(-o-SO<sub>3</sub>X)-p-SO<sub>2</sub>-C<sub>6</sub>H<sub>3</sub>(-  
m-SO<sub>3</sub>X)-p-OArO and C<sub>6</sub>H<sub>3</sub>(-o-CN)OAr'O (Ar, Ar' = divalent arom.; X =  
H, monovalent cation) with acidic compds. Compns. contg. 50-100% of  
the polymers, ion-conducting membranes contg. the polymers and/or  
the compns., composites of the membranes and electrodes, fuel cells  
contg. the composites, and adhesives contg. the polymers are also  
claimed. Thus, a cast film of 4,4'-biphenol-2,6-  
dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenylsulfone  
disodium salt copolymer was immersed in water, treated with aq.  
H<sub>2</sub>SO<sub>4</sub>, and left in water to give a film, which was immersed in  
polyphosphoric acid and heated, immersed in 1 N-H<sub>2</sub>SO<sub>4</sub>, washed, and  
dried to give a film showing proton cond. 0.24 S/cm.

IT 681035-31-4DP, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-  
disulfo-4,4'-dichlorodiphenylsulfone disodium salt copolymer,  
hydrolyzed  
RL: DEV (Device component use); IMF (Industrial manufacture); TEM  
(Technical or engineered material use); PREP (Preparation)  
; USES (Uses)  
(ion-conducting polymers and their manuf. for ion-conducting

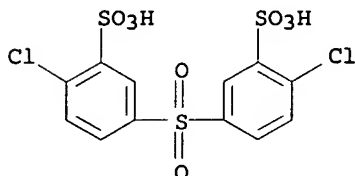
membranes in fuel cell membrane-  
electrode assemblies and adhesives)

RN 681035-31-4 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile  
(9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

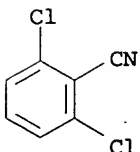


● 2 Na

CM 2

CRN 1194-65-6

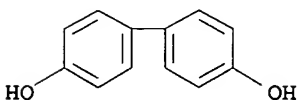
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



IC ICM C08G085-00  
ICS C08G075-23; C09J011-08; C09J201-00; C09J201-02; C09J201-08;  
H01B001-06; H01M008-02; H01M008-10  
CC 38-3 (Plastics Fabrication and Uses)  
Section cross-reference(s): 48, 52, 76  
IT 681035-31-4DP, 4,4'-Biphenol-2,6-dichlorobenzonitrile-3,3'-  
disulfo-4,4'-dichlorodiphenylsulfone disodium salt copolymer,  
hydrolyzed  
RL: DEV (Device component use); IMF (Industrial manufacture); TEM  
(Technical or engineered material use); PREP (Preparation)  
; USES (Uses)  
(ion-conducting polymers and their manuf. for ion-conducting

membranes in fuel cell membrane-  
electrode assemblies and adhesives)

L15 ANSWER 20 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:638265 HCAPLUS

DOCUMENT NUMBER: 143:156320

TITLE: Membrane-electrode assemblies showing good  
low-temperature performance for solid polymer  
electrolyte fuel cells, and vehicles and  
electric apparatus using them

INVENTOR(S): Kanaoka, Osayuki; Mitsuda, Naoki; Hama,  
Yuichiro; Takahashi, Ryoichiro; Soma, Hiroshi;  
Iguchi, Masaru; Asano, Yoichi

PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 38 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005197236	A2	20050721	JP 2004-356428	20041209
US 2005186460	A1	20050825	US 2004-6617	20041208
EP 1603182	A1	20051207	EP 2004-29067	20041208

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU,  
PL, SK, BA, HR, IS, YU

PRIORITY APPLN. INFO.: JP 2003-410958 A 20031209

AB The assemblies have polymeric electrolyte membranes comprising segments A with ion conductive components and segments B without ion conductive components, where the content of water having m.p. from -30° to 0° is 0.01-3.0 g/1 g-polymer absorbed by the membranes after soaking in water at 90° for 30. Preferably, the segments A are SO<sub>3</sub>H-contg. polyarylenes, and the segments B are polyarylenes. The assemblies suppress drying under low humidity condition or freezing at low temp., resulting in the fuel cells showing good start up performance.

IT 849729-07-3DP, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate block copolymer, hydrolyzed 849729-08-4DP, 9,9-Bis(4-hydroxyphenyl)fluorene-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate block copolymer, hydrolyzed 849729-10-8DP, 9,9-Bis(4-hydroxyphenyl)fluorene-2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate block copolymer, hydrolyzed 849729-12-0DP, 4,4'-Biphenol-2,2-bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate block copolymer, hydrolyzed 852156-73-1DP, hydrolyzed 860020-60-6DP, hydrolyzed

RL: DEV (Device component use); IMF (Industrial manufacture);

PREP (Preparation); USES (Uses)

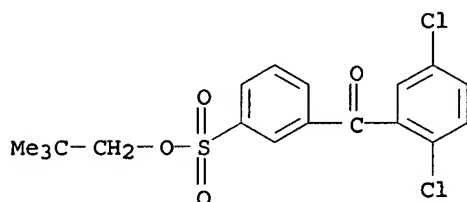
(membrane-electrode assemblies showing good

low-temp. performance for solid polymer electrolyte fuel  
cells for vehicles and elec. app.)

RN 849729-07-3 HCAPLUS  
CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl  
ester, polymer with 2,6-dichlorobenzonitrile and  
4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethyldiene)bis[phenol],  
block (9CI) (CA INDEX NAME)

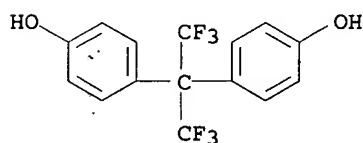
CM 1

CRN 847972-43-4  
CMF C18 H18 Cl2 O4 S



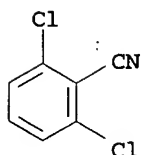
CM 2

CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 3

CRN 1194-65-6  
CMF C7 H3 Cl2 N

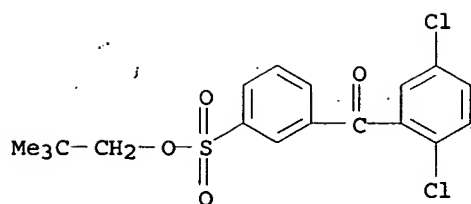


RN 849729-08-4 HCAPLUS  
CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl  
ester, polymer with 2,6-dichlorobenzonitrile and  
4,4'-(9H-fluoren-9-ylidene)bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

CRN 847972-43-4  
CMF C18 H18 Cl2 O4 S

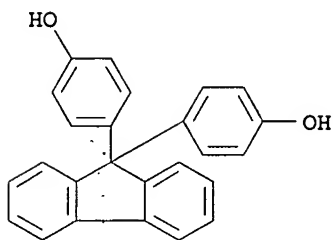




CM 2

CRN 3236-71-3

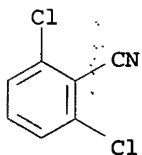
CMF C25 H18 O2



CM 3

CRN 1194-65-6

CMF C7 H3 Cl2 N



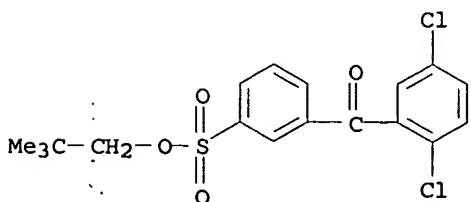
RN 849729-10-8 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with 2,6-dichlorobenzonitrile, 4,4'-(9H-fluoren-9-ylidene)bis[phenol] and 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethylidene)bis[phenol], block (9CI) (CA INDEX NAME)

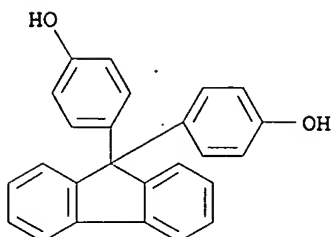
CM 1

CRN 847972-43-4

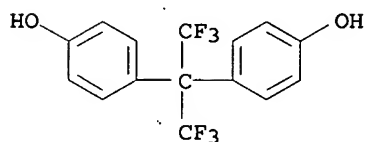
CMF C18 H18 Cl2 O4 S



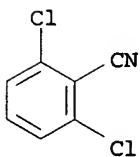
CM 2

CRN 3236-71-3  
CMF C25 H18 O2

CM 3

CRN 1478-61-1  
CMF C15 H10 F6 O2

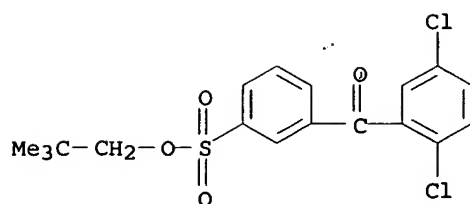
CM 4

CRN 1194-65-6  
CMF C7 H3 Cl2 N

RN 849729-12-0 HCAPLUS  
 CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with [1,1'-biphenyl]-4,4'-diol, 2,6-dichlorobenzonitrile and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

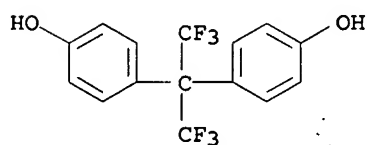
CRN 847972-43-4  
CMF C18 H18 Cl2 O4 S



CM 2

CRN 1478-61-1

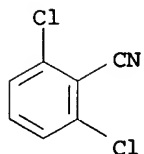
CMF C15 H10 F6 O2



CM 3

CRN 1194-65-6

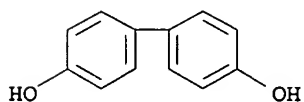
CMF C7 H3 Cl2 N



CM 4

CRN 92-88-6

CMF C12 H10 O2



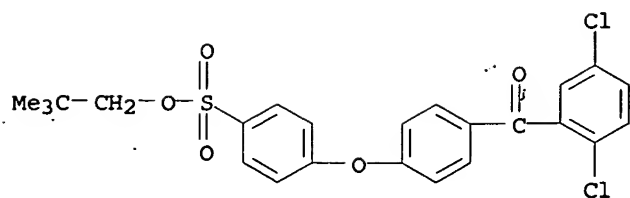
RN 852156-73-1 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

CRN 663920-26-1

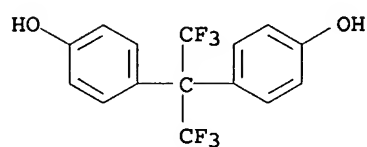
CMF C24 H22 Cl2 O5 S



CM 2

CRN 1478-61-1

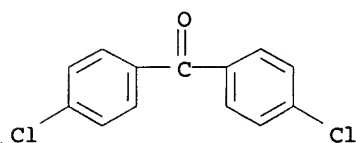
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



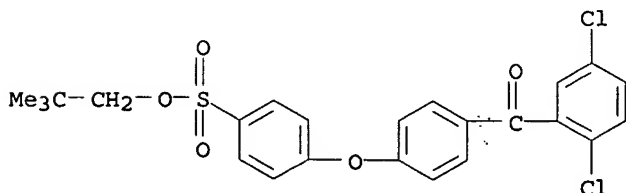
RN 860020-60-6 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-hydroxyphenyl)methanone and 1,1'-sulfonylbis[4-chlorobenzene], block (9CI) (CA INDEX NAME)

CM 1

CRN 663920-26-1

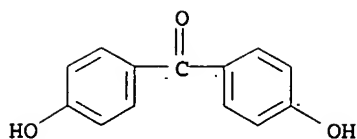
CMF C24 H22 Cl2 O5 S



CM 2

CRN 611-99-4

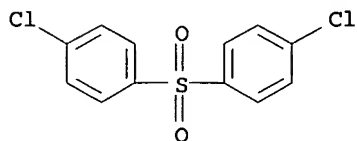
CMF C13 H10 O3



CM 3

CRN 80-07-9

CMF C12 H8 C12 O2 S



IC ICM H01M008-02

ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38, 76

IT 849729-07-3DP, 2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate block copolymer, hydrolyzed  
 849729-08-4DP, 9,9-Bis(4-hydroxyphenyl)fluorene-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate block copolymer, hydrolyzed  
 849729-10-8DP, 9,9-Bis(4-hydroxyphenyl)fluorene-2,2-Bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate block copolymer, hydrolyzed  
 849729-12-0DP, 4,4'-Biphenol-2,2-bis(4-hydroxyphenyl)-1,1,1,3,3,3-hexafluoropropane-2,6-dichlorobenzonitrile-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate block copolymer, hydrolyzed  
 852156-73-1DP, hydrolyzed 860020-60-6DP, hydrolyzed

RL: DEV (Device component use); IMF (Industrial manufacture);

PREP (Preparation); USES (Uses)

(membrane-electrode assemblies showing good low-temp. performance for solid polymer electrolyte fuel cells for vehicles and elec. app.)

L15 ANSWER 21 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:611317 HCAPLUS

DOCUMENT NUMBER: 143:118054

TITLE: Manufacture of membrane electrode assembly for polymer electrolyte fuel cell

INVENTOR(S): Takahashi, Yasushi

PATENT ASSIGNEE(S): Toyota Motor Corp., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005190702	A2	20050714	JP 2003-427281	

Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

200312  
24

PRIORITY APPLN. INFO.:

JP 2003-427281

200312  
24

AB The assembly is manufd. by the following steps: (1) forming an electrode layer contg. an electrolyte, catalysts and a high-m.p. fluoropolymer, (2) ion-exchanging the electrolyte from H+ type to salt type, (3) thermally press-bonding the resulting electrode layer with an electrolyte membrane having high softening point at a bonding temp. higher than the m.p. of the fluoropolymer, and (4) ion-exchanging the press-bonded assembly into H+ type. The electrolyte membrane is protected from damage during the manuf. and the obtained assembly has high bonding adhesion.

IT 302924-87-4, 4,4'-Diamino-2,2'-biphenyldisulfonic acid-4,4'-(9-fluorenylidene) dianiline-1,4,5,8-naphthalenetetracarboxylic dianhydride copolymer  
RL: CPS (Chemical process); DEV (Device component use); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process); USES (Uses)

(electrolyte membrane; manuf. of membrane  
electrode assembly with high bonding adhesion for polymer  
electrolyte fuel cell)

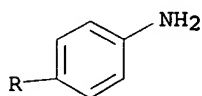
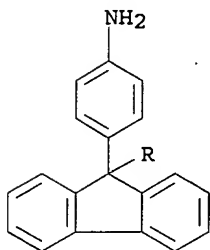
RN 302924-87-4 HCAPLUS

CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 15499-84-0

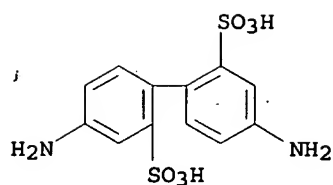
CMF C25 H20 N2



CM 2

CRN 117-61-3

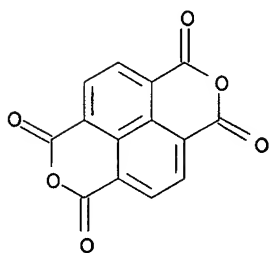
CMF C12 H12 N2 O6 S2



CM 3

CRN 81-30-1

CMF C14 H4 O6



IC ICM H01M008-02

ICS H01M004-88; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 163294-14-2, Nafion 112 302924-87-4, 4,4'-Diamino-2,2'-biphenyldisulfonic acid-4,4'-(9-fluorenylidene) dianiline-1,4,5,8-naphthalenetetracarboxylic dianhydride copolymer

RL: CPS (Chemical process); DEV (Device component use); PEP

(Physical, engineering or chemical process); PYP (Physical process);

PROC (Process); USES (Uses)

(electrolyte membrane; manuf. of membrane

electrode assembly with high bonding adhesion for polymer

electrolyte fuel cell)

L15 ANSWER 22 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:471208 HCAPLUS

DOCUMENT NUMBER: 143:8875

TITLE: Acidic group-containing polybenzimidazole compositions and their application

INVENTOR(S): Sakaguchi, Yoshimitsu; Kitamura, Kota

PATENT ASSIGNEE(S): Toyobo Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 27 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

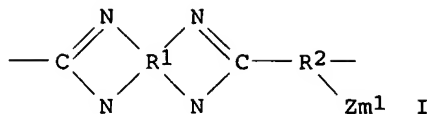
LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005139318	A2	20050602	JP 2003-377857	20031107
PRIORITY APPLN. INFO.:				20031107

GI



AB The compns. contain polybenzimidazoles having structural units I (m1 = 1-4; R1 = imidazole ring-forming tetravalent arom. bonding unit; R2 = divalent arom. bonding unit; Z = sulfonic acid residue, phosphonic acid residue) and poly(arylene ethers) having structural units of C6H3(SO3X)-p-YC6H3(SO3X)-p-OArO (both SO3X are in m-position to Y; Ar = divalent arom.; Y = SO2, CO; X = H, monovalent cation) and C6H3(o-CN)OAr'O (Ar' = divalent arom.). Ion-conductive membranes contg. the compns., their composites with electrodes, fuel cells using the composites and preferably a MeOH fuel, water electrolysis app. using the composites, adhesives contg. the compns., and manuf. of the ion-conductive membranes by casting step and drying step are also claimed. Thus, a soln. contg. 2,5-dicarboxybenzenesulfonic acid monosodium salt-3,3',4,4'-tetraaminodiphenylsulfone copolymer and 4,4'-biphenol-2,6-dichlorobenzonitrile-3,3'-disulfo-4,4'-dichlorodiphenylsulfone disodium salt copolymer was cast to give a film, which was processed to give a membrane showing ion cond. 0.034 S/cm and MeOH permeability 2.97 mmol/m2-s.

IT 681035-31-4P 852415-23-7P

RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(polybenzimidazole- and poly(arylene ether)-contg. compns. for ion-conductive membranes in fuel cells and water electrolysis app. and adhesives)

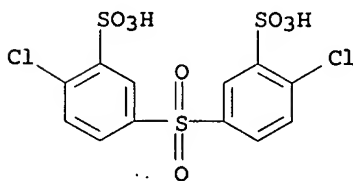
RN 681035-31-4 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na



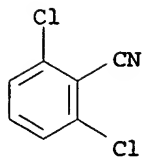
● 2 Na

CM . 2

CRN 1194-65-6



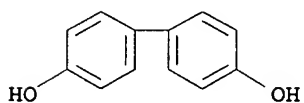
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



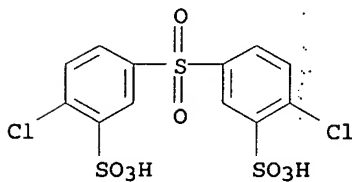
RN 852415-23-7 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, polymer with  
[1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile (9CI) (CA  
INDEX NAME)

CM 1

CRN 57570-28-2

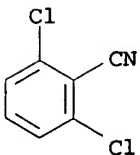
CMF C12 H8 Cl2 O8 S3



CM 2

CRN 1194-65-6

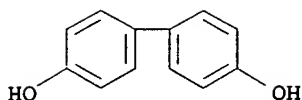
CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6

CMF C12 H10 O2



IC ICM C08G073-18  
 ICS C08G065-34; C08J005-22; C09J171-10; C09J179-04; C25B013-08;  
 H01B001-06; H01B013-00; H01M008-02; H01M008-10; C08L079-06  
 CC 38-3 (Plastics Fabrication and Uses)  
 Section cross-reference(s): 52, 72  
 ST fuel cell ion conductive membrane polybenzimidazole polyoxyarylene;  
 methanol fuel cell ion conductive membrane; water  
 electrolysis app ion conductive membrane electrode  
 composite; adhesive acid group polybenzimidazole polyarylene ether;  
 dicarboxybenzenesulfonic acid tetraaminodiphenylsulfone copolymer  
 ion conductive membrane; biphenol dichlorobenzonitrile  
 disulfodichlorodiphenylsulfone copolymer ion conductive membrane  
 IT 425636-38-0P, 2,5-Dicarboxybenzenesulfonic acid monosodium  
 salt-3,3',4,4'-tetraaminodiphenylsulfone copolymer 426255-33-6P  
 681035-31-4P 852415-23-7P  
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM  
 (Technical or engineered material use); PREP (Preparation)  
 ; USES (Uses)  
 (polybenzimidazole- and poly(arylene ether)-contg. compns. for  
 ion-conductive membranes in fuel cells and water electrolysis  
 app. and adhesives)

L15 ANSWER 23 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:280916 HCAPLUS

DOCUMENT NUMBER: 142:319886

TITLE: Manufacture of sulfonic acid-containing  
 polyarylenes for polymer solid electrolytes,  
 proton-conductive membranes, and battery  
 electrodes

INVENTOR(S): Yamakawa, Yoshitaka; Higami, Makoto

PATENT ASSIGNEE(S): JSR Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005082757	A2	20050331	JP 2003-318465	200309 10
PRIORITY APPLN. INFO.:			JP 2003-318465	200309 10

AB The polyarylenes are manufd. by reaction of (A)  
 $C_6H_3Z_2[XC_6H_3(SO_3R)]_mXC_6H_4(SO_3R)$  (X = divalent org. group or single  
 bond; R = hydrocarbon group; Z =  $OSO_2CH_3$ ,  $OSO_2CF_3$ , halo except for  
 F; m = 0-10) and (B)  $C_6H_3Z_2(XAr)$  and/or  $C_6H_4ZXC_6H_4Z$  (X, Z = same as  
 the above; Ar = arom. ring), and hydrolysis of the resulting  
 copolymers. The polyarylenes satisfy av. no. of continuous linkages  
 of A unit 1.0-4.0. The polyarylenes show improved hot water  
 resistance and protonic cond.

IT 847972-44-SDP, terminated with 4-chlorobenzophenone,  
 hydrolyzed

RL: DEV (Device component use); IMF (Industrial manufacture);

PREP (Preparation); USES (Uses)

(manuf. of sulfonic acid-contg. polyarylenes for polymer solid electrolytes, proton-conductive membranes, and battery electrodes)

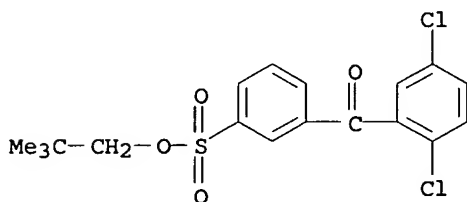
RN 847972-44-5 HCAPLUS

CN Benzenesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with (2,5-dichlorophenyl)phenylmethanone (9CI) (CA INDEX NAME)

CM 1

CRN 847972-43-4

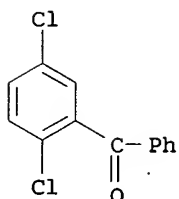
CMF C18 H18 Cl2 O4 S



CM 2

CRN 16611-67-9

CMF C13 H8 Cl2 O



IC ICM C08G061-10

ICS H01B001-06; H01B013-00; H01M008-02; H01M008-10; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 76

IT 134-85-0DP, 4-Chlorobenzophenone, reaction products with 2,5-dichlorobenzophenone-neopentyl 3-(2,5-dichlorobenzoyl)benzenesulfonate copolymer, hydrolyzed 847972-44-5DP, terminated with 4-chlorobenzophenone, hydrolyzed

RL: DEV (Device component use); IMF (Industrial manufacture);

PREP (Preparation); USES (Uses)

(manuf. of sulfonic acid-contg. polyarylenes for polymer solid electrolytes, proton-conductive membranes, and battery electrodes)

L15 ANSWER 24 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:253340 HCAPLUS

DOCUMENT NUMBER: 142:319817

TITLE: Membrane-electrode structure for solid polymer fuel cell

INVENTOR(S): Otsuki, Toshihiro; Goto, Kohei; Takahashi, Ryoichiro; Asano, Yoichi

PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan; JSR Corporation

SOURCE: Eur. Pat. Appl., 25 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1517390	A2	20050323	EP 2004-22083	20040916
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR				
JP 2005116517	A2	20050428	JP 2004-262700	20040909
US 2005064260	A1	20050324	US 2004-941899	20040916
CA 2482061	AA	20050319	CA 2004-2482061	20040917
PRIORITY APPLN. INFO.:			JP 2003-328310	A 20030919

AB Disclosed is a membrane-electrode structure for a solid polymer fuel cell comprising a pair of electrode catalyst layers and a polyelectrolyte membrane sandwiched between the electrode catalyst layers, wherein the electrode catalyst layers contain polyarylene having a sulfonic acid group.

IT 663920-28-3P

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)

(membrane-electrode structure for solid polymer fuel cell)

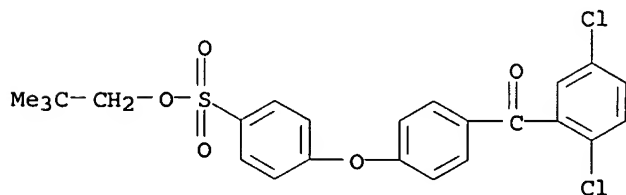
RN 663920-28-3 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 663920-26-1

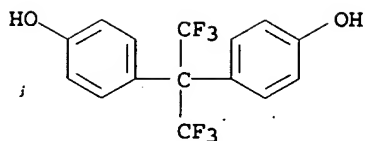
CMF C24 H22 Cl2 O5 S



CM 2

CRN 1478-61-1

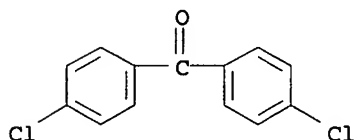
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

IT 463963-71-5P 663920-28-3P

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)

(membrane-electrode structure for solid  
polymer fuel cell)

L15 ANSWER 25 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:201362 HCAPLUS

DOCUMENT NUMBER: 143:10419

TITLE: Wholly aromatic sulfonated polyarylenethioether  
sulfone copolymers as PEM for fuel cellsAUTHOR(S): Bai, Zongwu; Dang, Thuy D.; Durstock, Michael  
F.; Rodrigues, Stanley J.; Reitz, Thom L.CORPORATE SOURCE: University of Dayton Research Institute,  
University of Dayton, Dayton, OH, 45469, USASOURCE: Polymer Preprints (American Chemical Society,  
Division of Polymer Chemistry) (2005), 46(1),  
865-866

CODEN: ACPPAY; ISSN: 0032-3934

PUBLISHER: American Chemical Society, Division of Polymer  
Chemistry

DOCUMENT TYPE: Journal; (computer optical disk)

LANGUAGE: English

AB While sulfonated perfluorinated copolymers such as Nafion are good proton conductors and are very stable chem. for use as fuel cell electrolytes they have several limitations, some of which include (1) low moduli as well as modest glass-transition temps.; (2) reduced cond. at temps. above 80 °C; and (3) relatively high methanol permeability, and (4) high cost. Sulfonated high performance polymers based on arylene ether and thioether linkages in the backbone for potential fuel cell applications has been reported, with the polymers having promising thermal stability, chem. resistance, water uptake and proton cond. data. In this paper, the synthesis and characterization of highly sulfonated aryleneethioethersulfone copolymers were developed, end-capped with diphenylsulfone groups, with the sulfonic acid functionality directly on the arylene thioether in the backbone. Elec. conductivities, yield strength, and tensile modulus of the membranes was higher, a much lower elongation at break than for a Nafion membrane under similar conditions. The peak power output, voltage, and max.

current for a hydrogen fuel cell with membrane electrodes made with 45% sulfonated SPTES was higher than for similar conditions using Nafion 117.

IT 852628-83-2P

RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); RACT (Reactant or reagent); USES (Uses)  
(wholly arom. sulfonated polyarylenethioether sulfone copolymers as PEM for fuel cells)

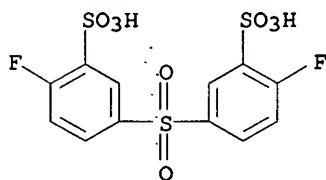
RN 852628-83-2 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, disodium salt, polymer with 1,1'-sulfonylbis[4-fluorobenzene] and 4,4'-thiobis[benzenethiol] (9CI) (CA INDEX NAME)

CM 1

CRN 301155-59-9

CMF C12 H8 F2 O8 S3 . 2 Na

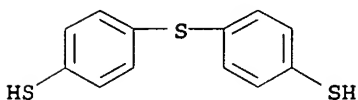


● 2 Na

CM 2

CRN 19362-77-7

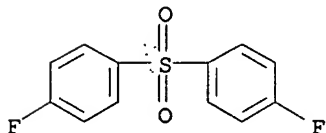
CMF C12 H10 S3



CM 3

CRN 383-29-9

CMF C12 H8 F2 O2 S



IT 852628-83-2DP, proton-exchanged acid form

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)  
(wholly arom. sulfonated polyarylenethioether sulfone copolymers)

as PEM for fuel cells)

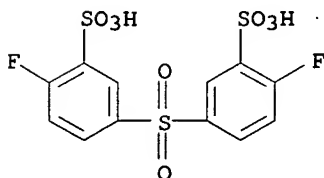
RN 852628-83-2 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, disodium salt,  
polymer with 1,1'-sulfonylbis[4-fluorobenzene] and  
4,4'-thiobis[benzenethiol] (9CI) (CA INDEX NAME)

CM 1

CRN 301155-59-9

CMF C12 H8 F2 O8 S3 . 2 Na

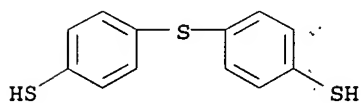


● 2 Na

CM 2

CRN 19362-77-7

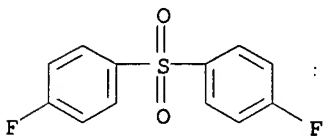
CMF C12 H10 S3



CM 3

CRN 383-29-9

CMF C12 H8 F2 O2 S



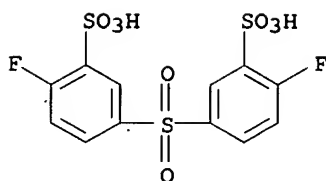
IT 301155-59-9P

RL: SPN (Synthetic preparation); PREP (Preparation)

(wholly arom. sulfonated polyarylenethioether sulfone copolymers  
as PEM for fuel cells)

RN 301155-59-9 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-fluoro-, disodium salt  
(9CI) (CA INDEX NAME)



●2 Na

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 35, 36, 38, 76  
 IT 852628-83-2P  
 RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); RCT (Reactant); SPN (Synthetic preparation); **PREP (Preparation)**; PROC (Process); RACT (Reactant or reagent); USES (Uses)  
 (wholly arom. sulfonated polyarylenethioether sulfone copolymers as PEM for fuel cells)  
 IT 852628-83-2DP, proton-exchanged acid form  
 RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); **PREP (Preparation)**; PROC (Process)  
 (wholly arom. sulfonated polyarylenethioether sulfone copolymers as PEM for fuel cells)  
 IT 301155-59-9P  
 RL: SPN (Synthetic preparation); **PREP (Preparation)**  
 (wholly arom. sulfonated polyarylenethioether sulfone copolymers as PEM for fuel cells)  
 REFERENCE COUNT: 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L15 ANSWER 26 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2005:121271 HCAPLUS  
 DOCUMENT NUMBER: 142:201622  
 TITLE: Electrolyte membrane and electrodes for fuel cell assembly  
 INVENTOR(S): Yamashita, Masahiro; Sakaguchi, Yoshimitsu; Takase, Satoshi; Kitamura, Kota  
 PATENT ASSIGNEE(S): Toyo Boseki Kabushiki Kaisha, Japan  
 SOURCE: PCT Int. Appl., 90 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005013399	A1	20050210	WO 2004-JP10807	20040729

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW  
 RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW,



AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ,  
 DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL,  
 PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ,  
 GW, ML, MR, NE, SN, TD, TG

JP 3651682	B2	20050525	JP 2004-39238	200402 17
JP 2005232203	A2	20050902		
JP 3651683	B2	20050525	JP 2004-50751	200402 26
JP 2005243385	A2	20050908		
JP 2005243383	A2	20050908	JP 2004-50749	200402 26
JP 2005243384	A2	20050908	JP 2004-50750	200402 26
JP 3651684	B2	20050525	JP 2004-53388	200402 27
JP 2005243494	A2	20050908		
JP 2005243492	A2	20050908	JP 2004-53385	200402 27
JP 2005243493	A2	20050908	JP 2004-53386	200402 27
JP 2005063944	A2	20050310	JP 2004-171319	200406 09
EP 1653541	A1	20060503	EP 2004-771020	200407 29

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
 PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK

PRIORITY APPLN. INFO.:

JP 2003-204725	A	200307 31
JP 2004-39238	A	200402 17
JP 2004-50749	A	200402 26
JP 2004-50750	A	200402 26
JP 2004-50751	A	200402 26
JP 2004-53385	A	200402 27
JP 2004-53386	A	200402 27
JP 2004-53388	A	200402

27

JP 2003-53388

A

200402

27

WO 2004-JP10807

W

200407

29

AB Disclosed is an electrolyte membrane-electrode assembly wherein a hydrocarbon-based solid polymer electrolyte membrane is sandwiched between a pair of electrodes. In this electrolyte membrane-electrode assembly, the glass transition temp. of the electrolyte membrane in a dry state is not less than 160°C and the max. moisture content of the electrolyte membrane is 10-120%. The electrolyte membrane-electrode assembly is excellent in reliability and durability.

IT 267877-35-0P 681035-31-4P 839469-88-4P

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)

(prepn. of electrolyte membrane and electrodes  
for fuel cell assembly)

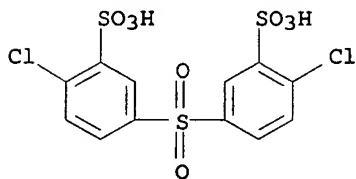
RN 267877-35-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with [1,1'-biphenyl]-4,4'-diol and 1,1'-sulfonylbis[4-chlorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

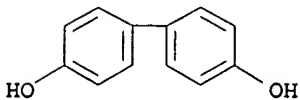


●2 Na

CM 2

CRN 92-88-6

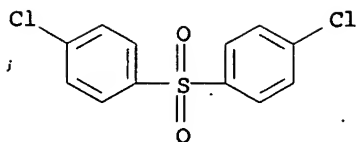
CMF C12 H10 O2



CM 3

CRN 80-07-9

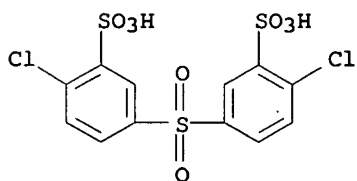
CMF C12 H8 Cl2 O2 S



RN 681035-31-4 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
 polymer with [1,1'-biphenyl]-4,4'-diol and 2,6-dichlorobenzonitrile  
 (9CI) (CA INDEX NAME)

CM 1

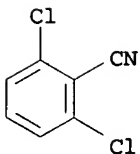
CRN 51698-33-0  
 CMF C12 H8 Cl2 O8 S3 . 2 Na



● 2 Na

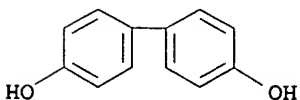
CM 2

CRN 1194-65-6  
 CMF C7 H3 Cl2 N



CM 3

CRN 92-88-6  
 CMF C12 H10 O2

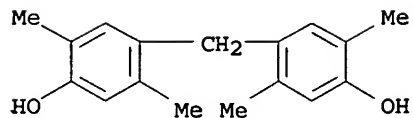


RN 839469-88-4 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
 polymer with [1,1'-biphenyl]-4,4'-diol, bis(4-fluorophenyl)methanone  
 and 4,4'-methylenedi-2,5-dimethylphenol (9CI) (CA INDEX NAME)

CM 1

CRN 111329-41-0

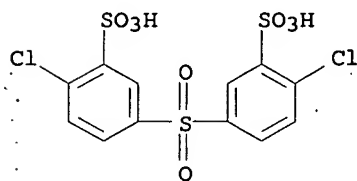
CMF C17 H20 O2



CM 2

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

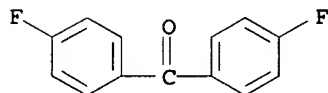


● 2 Na

CM 3

CRN 345-92-6

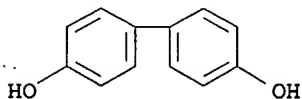
CMF C13 H8 F2 O



CM 4

CRN 92-88-6

CMF C12 H10 O2



IC ICM H01M008-02

ICS H01M008-10; C08J005-22; C08L071-10; C08G065-40; C08G065-48

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 36

IT 267877-35-0P 681035-31-4P 683774-17-6P

839469-88-4P

RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)  
(prepn. of electrolyte membrane and electrodes  
for fuel cell assembly)

REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE  
FOR THIS RECORD. ALL CITATIONS AVAILABLE  
IN THE RE FORMAT

L15 ANSWER 27 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2005:120319 HCAPLUS

DOCUMENT NUMBER: 142:201611

TITLE: Electrolyte membrane, its manufacture, and its  
use in membrane electrode assembly for  
alcohol-type fuel cell

INVENTOR(S): Nakano, Yoshihiko; Yamaguchi, Shinsuke

PATENT ASSIGNEE(S): Toshiba Corp., Japan; Ushio Inc.

SOURCE: Jpn. Kokai Tokkyo Koho, 26 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2005038620	A2	20050210	JP 2003-197089	200307 15
				200307 15

PRIORITY APPLN. INFO.: JP 2003-197089

AB The membrane is manufd. by irradiating electron beam having  
accelerating voltage 5-45 kV to a proton-conducting membrane contg.  
polymers with skeletons of fluoropolymers or (ArA)<sub>n</sub> (Ar = arom.  
hydrocarbon ring; A = direct bond, O, S, CO, CR12, SO, SO2; R1 = H,  
F, hydrocarbyl, alkoxy) and functional groups of SO2Y and/or SO3Z (Y  
= halo, NH2, NHR, NHSO2R; Z = H, alkali metal, hydrocarbyl, NR4; R =  
hydrocarbyl, alkoxy) at 1-750 Torr in an atm. having O content  
500-10,000 ppm. The membranes has high cond. and low MeOH  
permeability.

IT 455944-36-2P

RL: DEV (Device component use); IMF (Industrial manufacture); PEP  
(Physical, engineering or chemical process); PYP (Physical process);  
TEM (Technical or engineered material use); PREP  
(Preparation); PROC (Process); USES (Uses)

(electrolyte membrane manufd. by electron beam irradiation for  
membrane electrode assembly in alc.-type  
fuel cell)

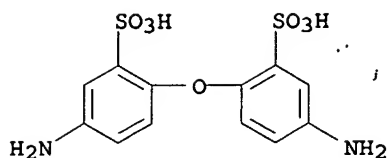
RN 455944-36-2 HCAPLUS

CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with  
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and  
4,4'-oxybis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

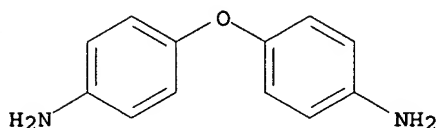
CRN 6375-06-0

CMF C12 H12 N2 O7 S2



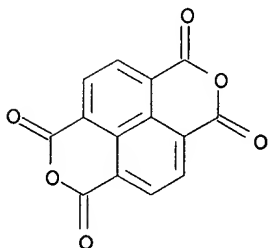
CM 2

CRN 101-80-4  
CMF C12 H12 N2 O



CM 3

CRN 81-30-1  
CMF C14 H4 O6



IC ICM H01M008-02

ICS H01B001-06; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38

IT 455944-36-2P

RL: DEV (Device component use); IMF (Industrial manufacture); PEP  
(Physical, engineering or chemical process); PYP (Physical process);  
TEM (Technical or engineered material use); **PREP**  
(**Preparation**); PROC (Process); USES (Uses)  
(electrolyte membrane manufd. by electron beam irradiation for  
**membrane electrode assembly in alc.-type**  
**fuel cell**)

L15 ANSWER 28 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:1011984 HCAPLUS

DOCUMENT NUMBER: 142:9166

TITLE: **Membrane-electrode assembly**  
for direct **methanol** type fuel cell and  
proton conductive membrane

INVENTOR(S): Okada, Takashi; Goto, Kohei

PATENT ASSIGNEE(S): JSR Corporation, Japan

SOURCE: Eur. Pat. Appl., 47 pp.

CODEN: EPXXDW

DOCUMENT TYPE: Patent

Ross Shipe EIC 1700 Remsen 4B31 571/272-6018

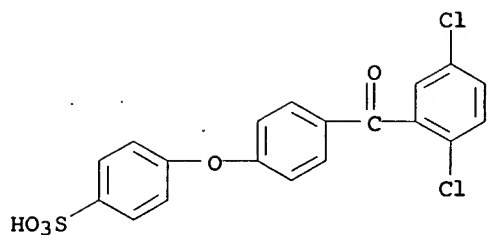
LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1479714	A1	20041124	EP 2004-11986	20040519
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR				
JP 2004346164	A2	20041209	JP 2003-143914	20030521
CA 2467613	AA	20041121	CA 2004-2467613	20040518
KR 2004101029	A	20041202	KR 2004-36039	20040520
US 2004265668	A1	20041230	US 2004-849182	20040520
PRIORITY APPLN. INFO.:			JP 2003-143914	A 20030521

AB A membrane-electrode assembly for direct methanol type fuel cell and a proton conductive membrane for direct methanol type fuel cell are disclosed. The membrane-electrode assembly comprises a neg. electrode and a pos. electrode assembled via a proton conductive membrane, the neg. electrode being provided with a neg. electrode-side separator having a mechanism for feeding a methanol aq. soln. as a fuel, the pos. electrode being provided with a pos. electrode-side separator having a mechanism for feeding an oxidizing agent gas, and the proton conductive membrane comprising a polymer contg. 0.05-99.95 mol% of polyarylene unit bearing sulfonic acid groups and 0.05-99.95 mol% of other substituted polyarylene unit.

IT 663920-23-8P, Sodium 4-[4-(2,5-dichlorobenzoyl)phenoxy]benzenesulfonate 663920-25-0P 663920-26-1P 796973-89-2P 796973-92-7P  
 RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (manuf. of membrane-electrode assembly for direct methanol type fuel cell and proton conductive membrane)

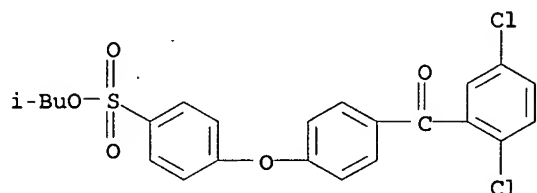
RN 663920-23-8 HCAPLUS  
 CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, sodium salt (9CI) (CA INDEX NAME)



● Na

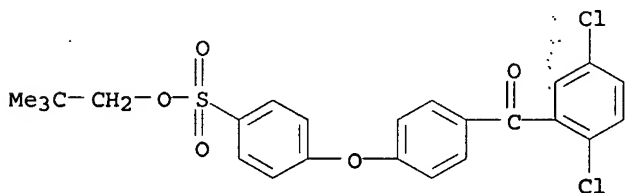
RN 663920-25-0 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2-methylpropyl ester (9CI) (CA INDEX NAME)



RN 663920-26-1 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester (9CI) (CA INDEX NAME)



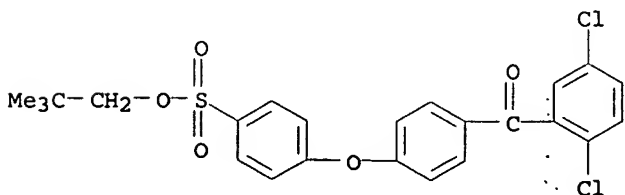
RN 796973-89-2 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with [1,1'-biphenyl]-2,5-diol and bis(4-fluorophenyl)methanone (9CI) (CA INDEX NAME)

CM 1

CRN 663920-26-1

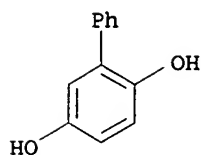
CMF C24 H22 Cl2 O5 S





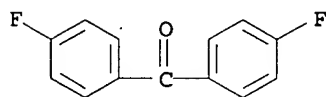
CM 2

CRN 1079-21-6  
CMF C12 H10 O2



CM 3

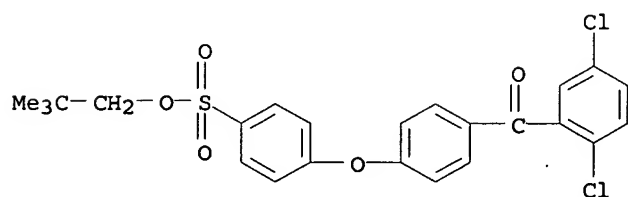
CRN 345-92-6  
CMF C13 H8 F2 O



RN 796973-92-7 HCAPLUS  
CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone and 5,5'-(9H-fluoren-9-ylidene)bis[[1,1'-biphenyl]-2-ol] (9CI) (CA INDEX NAME)

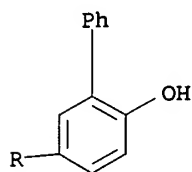
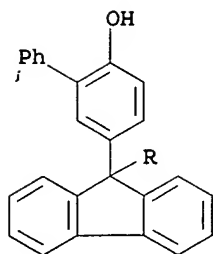
CM 1

CRN 663920-26-1  
CMF C24 H22 Cl2 O5 S



CM 2

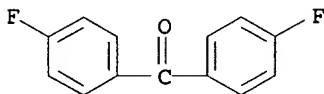
CRN 161256-84-4  
CMF C37 H26 O2



CM 3

CRN 345-92-6

CMF C13 H8 F2 O



IT 796973-89-2DP, deprotected products 796973-92-7DP,  
deprotected products

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES  
(Uses)

(membranes; manuf. of membrane-electrode  
assembly for direct methanol type fuel  
cell and proton conductive membrane)

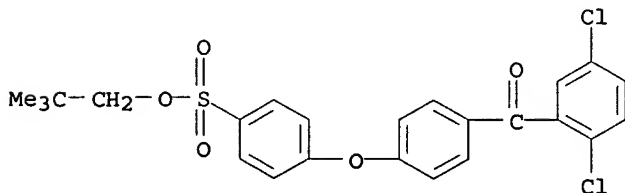
RN 796973-89-2 HCAPLUS

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-,  
2,2-dimethylpropyl ester, polymer with [1,1'-biphenyl]-2,5-diol and  
bis(4-fluorophenyl)methanone (9CI) (CA INDEX NAME)

CM 1

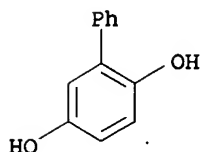
CRN 663920-26-1

CMF C24 H22 Cl2 O5 S



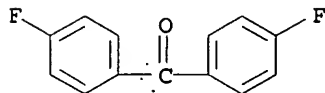
CM 2

CRN 1079-21-6  
CMF C12 H10 O2



CM 3

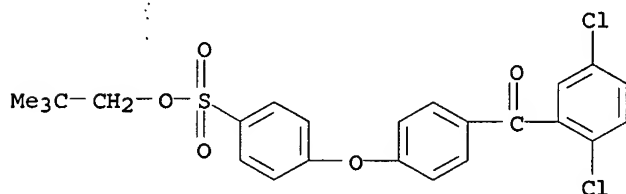
CRN 345-92-6  
CMF C13 H8 F2 O



RN 796973-92-7 HCAPLUS  
CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 2,2-dimethylpropyl ester, polymer with bis(4-fluorophenyl)methanone and 5,5'-(9H-fluoren-9-ylidene)bis[[1,1'-biphenyl]-2-ol] (9CI) (CA INDEX NAME)

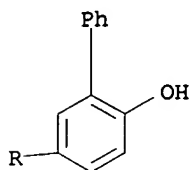
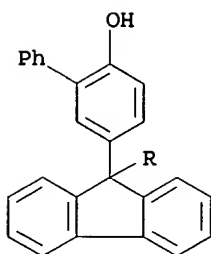
CM 1

CRN 663920-26-1  
CMF C24 H22 Cl2 O5 S



CM 2

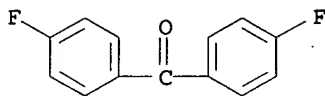
CRN 161256-84-4  
CMF C37 H26 O2



CM 3

CRN 345-92-6

CMF C13 H8 F2 O



- IC ICM C08J005-00  
ICS C08J005-22; C08J007-12; C08J007-14; C08K005-42; C08G061-12;  
H01M008-00; H01M008-10; H01M008-04
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST **methanol fuel cell electrode membrane**  
proton conductive
- IT Conducting polymers  
Fuel cells  
Membrane electrodes  
(manuf. of **membrane-electrode** assembly for  
direct **methanol** type fuel cell and proton conductive  
membrane)
- IT 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(electrode contg.; manuf. of **membrane-electrode**  
assembly for direct **methanol** type fuel cell and proton  
conductive membrane)
- IT 75-84-3P, 2,2-Dimethyl-1-propanol 118546-87-5P 125431-09-6DP,  
dichlorobenzophenone-terminated **663920-23-8P**, Sodium  
4-[(4-(2,5-dichlorobenzoyl)phenoxy]benzenesulfonate  
**663920-25-0P 663920-26-1P 796973-85-8DP**,  
dichlorobenzophenone-terminated 796973-87-0P **796973-89-2P**  
**796973-92-7P**  
RL: IMF (Industrial manufacture); RCT (Reactant); PREP  
(Preparation); RACT (Reactant or reagent)  
(manuf. of **membrane-electrode** assembly for  
direct **methanol** type fuel cell and  
proton conductive membrane)
- IT 78-83-1, 2-Methyl-1-propanol, reactions 10025-87-3, Phosphoryl  
trichloride 151173-25-0, 2,5-Dichloro-4'-phenoxybenzophenone  
**663920-24-9**

RL: RCT (Reactant); RACT (Reactant or reagent)  
(manuf. of membrane-electrode assembly for  
direct methanol type fuel cell and proton conductive  
membrane)

IT 796973-89-2DP, deprotected products 796973-92-7DP,  
deprotected products

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical  
or engineered material use); PREP (Preparation); USES  
(Uses)

(membranes; manuf. of membrane-electrode  
assembly for direct methanol type fuel  
cell and proton conductive membrane)

REFERENCE COUNT: 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

L15 ANSWER 29 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:974289 HCAPLUS

DOCUMENT NUMBER: 142:138190

TITLE: Direct Methanol Fuel Cell Performance of  
Disulfonated Poly(arylene ether benzonitrile)  
Copolymers

AUTHOR(S): Kim, Yu Seung; Sumner, Michael J.; Harrison,  
William L.; Riffle, Judy S.; McGrath, James E.;  
Pivovar, Bryan S.

CORPORATE SOURCE: Electronic and Electrochemical Materials and  
Devices, Los Alamos National Laboratory, Los  
Alamos, NM, 87545, USA

SOURCE: Journal of the Electrochemical Society (2004),  
151(12), A2150-A2156  
CODEN: JESOAN; ISSN: 0013-4651

PUBLISHER: Electrochemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB This paper reports the performance of direct methanol fuel  
cells (DMFCs) using novel disulfonated poly(arylene ether  
benzonitrile) copolymers derived from hexafluoroisopropylidene  
diphenol (6F), 2,6-dichlorobenzonitrile, and 3,3'-disulfonated  
4,4'-dichloro di-Ph sulfone (SDCDPS). The membrane  
electrode assembly (MEA) which employed the sulfonated  
copolymer with 35 mol % of disulfonated comonomer as the proton  
exchange membrane had .apprx.2-fold lower methanol  
crossover and slightly higher (.apprx.10%) cell resistance than the  
MEA using the perfluorosulfonic acid Nafion membrane, resulting in  
an .apprx.50% improvement in selectivity, regardless of membrane  
thickness. Accordingly, this MEA outperformed the Nafion MEA  
control in a DMFC single-cell test. For example, 200 mA/cm<sup>2</sup> was  
obtained (compared with 150 mA/cm<sup>2</sup> for the Nafion MEA) at 0.5 V at a  
temp. of 80 °C and ambient air pressure. Similar expts.  
performed with nonfluorine-contg. biphenol-based sulfonated  
poly(arylene ether sulfone) copolymers (BPSH) indicated that the  
compatibility of the polymer electrolyte with the electrodes likely  
has a crit. role in initial DMFC performance.

IT 267877-35-0, BPSH 40

RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(direct methanol fuel cell performance of disulfonated  
poly(arylene ether benzonitrile) copolymers)

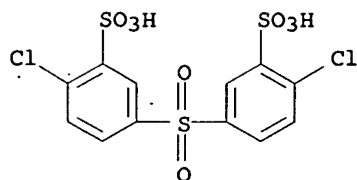
RN 267877-35-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt,  
polymer with [1,1'-biphenyl]-4,4'-diol and 1,1'-sulfonylbis[4-  
chlorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

CMF C12 H8 Cl2 O8 S3 . 2 Na

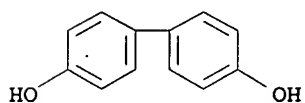


●2 Na

CM 2

CRN 92-88-6

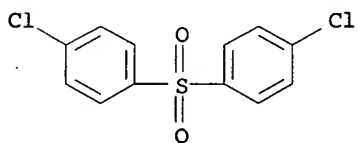
CMF C12 H10 O2



CM 3

CRN 80-07-9

CMF C12 H8 Cl2 O2 S



IT 627538-51-6DP, acidified with sulfuric acid

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PUR (Purification or recovery); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)

(direct methanol fuel cell performance of disulfonated poly(arylene ether benzonitrile) copolymers)

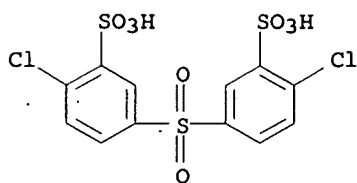
RN 627538-51-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-chloro-, disodium salt, polymer with 2,6-dichlorobenzonitrile and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 51698-33-0

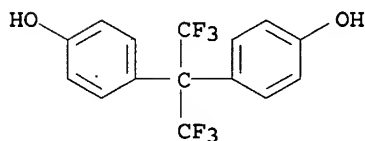
CMF C12 H8 Cl2 O8 S3 . 2 Na



●2 Na

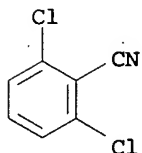
CM 2

CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 3

CRN 1194-65-6  
CMF C7 H3 Cl2 N



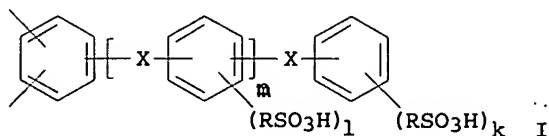
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 35, 38, 76
- IT Current density  
Ion exchange membranes  
Membrane electrodes  
Membranes, nonbiological  
Polyelectrolytes  
(direct methanol fuel cell performance of disulfonated poly(arylene ether benzonitrile) copolymers)
- IT Electric current-potential relationship  
(of assembled fuel cells with Nafion or aryl polysulfone polyether membrane electrodes; direct methanol fuel cell performance of disulfonated poly(arylene ether benzonitrile) copolymers)
- IT Size effect  
Thickness  
(thickness effect, of membranes used in membrane electrodes; direct methanol fuel cell performance of disulfonated poly(arylene ether benzonitrile) copolymers)
- IT 267877-35-0, BPSH 40  
RL: DEV (Device component use); PRP (Properties); USES (Uses)

(direct methanol fuel cell performance of disulfonated poly(arylene ether benzonitrile) copolymers)  
 IT 627538-51-6DP, acidified with sulfuric acid  
 RL: PEP (Physical, engineering or chemical process); PRP (Properties); PUR (Purification or recovery); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process)  
 (direct methanol fuel cell performance of disulfonated poly(arylene ether benzonitrile) copolymers)  
 REFERENCE COUNT: 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L15 ANSWER 30 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2004:632908 HCAPLUS  
 DOCUMENT NUMBER: 141:176868  
 TITLE: Polymer electrolyte, proton conductive membrane and membrane-electrode assembly  
 INVENTOR(S): Otsuki, Toshihiro; Kanaoka, Nagayuki; Iguchi, Masaru; Mitsuta, Naoki; Soma, Hiroshi  
 PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan; JSR Corporation  
 SOURCE: U.S. Pat. Appl. Publ., 13 pp.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004149965	A1	20040805	US 2004-768151	20040202
JP 2004256797	A2	20040916	JP 2004-15864	20040123
EP 1450430	A2	20040825	EP 2004-2358	20040203
EP 1450430	A3	20041124		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
PRIORITY APPLN. INFO.:		JP 2003-27268	A	20030204

GI



AB Disclosed are a polymer electrolyte having improved hot water resistance and radical resistance, a proton conductive membrane comprising the polymer electrolyte, and a membrane-electrode assembly including the proton conductive membrane. The polymer electrolyte comprises  $\geq 1$  polymer selected from polyether, polyketone, polyetherketone, polysulfone, polyethersulfone,



polyimide, polyetherimide, polybenzimidazole, polybenzothiazole, polybenzoxazole and the like. The polymer comprises a repeating structural unit with either or both of an arom. ring and a heterocyclic ring, and a repeating structural unit I, wherein X = a single bond, an electron-withdrawing group or an electron-donating group; R = a single bond, (CH<sub>2</sub>)<sub>q</sub> or (CF<sub>2</sub>)<sub>q</sub>; k = 0-5; l = 0-4 (k + l ≥ 1); and q, m = 0-10. Thus, 4,4'-dihydroxybiphenyl disodium salt 23.0, 4,4'-dichlorodiphenylsulfone 14.4, and 2,5-dichloro-4'-(4-phenoxyphenoxy)benzophenone 21.8 g were polymd. at 260° for 10 h and sulfonated to give an polyelectrolyte with acid equiv. 1.8 m-equiv./g and proton cond. 0.116 s/c, which was pressed between an oxygen electrode and a fuel electrode to give a membrane electrode assembly with c.d. 0.2 A/cm<sup>2</sup>.

IT 733037-91-7DP, sulfonated

RL: DEV (Device component use); IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(prepn. of polymer electrolytes for proton conductive membranes and membrane-electrode assembly)

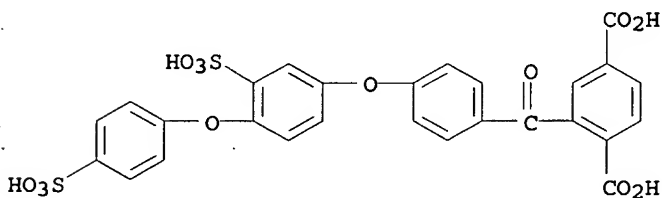
RN 733037-91-7 HCAPLUS

CN 1,4-Benzenedicarboxylic acid, 2-[4-[3-sulfo-4-(4-sulfophenoxy)phenoxy]benzoyl]-, disodium salt, polymer with 1,4-benzenedicarboxylic acid and 4,6-diamino-1,3-benzenediol dihydrochloride (9CI) (CA INDEX NAME)

CM 1

CRN 733037-90-6

CMF C27 H18 O13 S2 . 2 Na

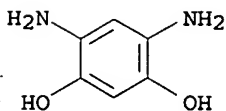


●2 Na

CM 2

CRN 16523-31-2

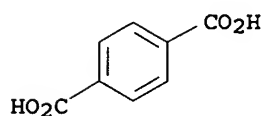
CMF C6 H8 N2 O2 . 2 Cl H



●2 HCl

CM 3

CRN 100-21-0  
CMF C8 H6 O4



IC ICM H01B001-00  
INCL 252500000  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
IT 733037-89-3DP, sulfonated 733037-91-7DP, sulfonated  
RL: DEV (Device component use); IMF (Industrial manufacture); PRP  
(Properties); TEM (Technical or engineered material use); PREP  
(Preparation); USES (Uses)  
(prepn. of polymer electrolytes for proton conductive  
membranes and membrane-electrode  
assembly)

L15 ANSWER 31 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN

ACCESSION NUMBER: 2004:493501 HCAPLUS

DOCUMENT NUMBER: 141:40719

TITLE: Method for producing membrane-electrode  
structure for polymer electrolyte fuel cell

INVENTOR(S): Tani, Masaki; Shinkai, Hiroshi; Kohyama,  
Katsuhiko; Tanaka, Ichiro; Hama, Yuichiro; Yano,  
Junichi

PATENT ASSIGNEE(S): Honda Motor Co., Ltd., Japan

SOURCE: U.S. Pat. Appl. Publ., 23 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

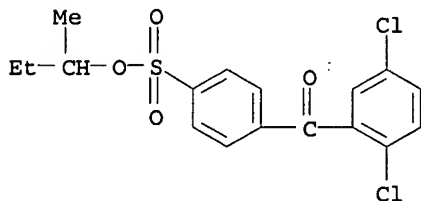
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004115499	A1	20040617	US 2003-721505	20031126
JP 2004193109	A2	20040708	JP 2003-371048	20031030
JP 2004221056	A2	20040805	JP 2003-371049	20031030
JP 2004214173	A2	20040729	JP 2003-371836	20031031
PRIORITY APPLN. INFO.:			JP 2002-347580	A 20021129
			JP 2002-366037	A 20021218
			JP 2002-379820	A 20021227

JP 2003-371048 A 200310  
30

JP 2003-371049 A 200310  
30

JP 2003-371836 A 200310  
31

- AB The present invention provides a method for producing a membrane-electrode structure having an excellent adhesiveness between an electrode catalyst layer and a diffusion electrode, and a polymer electrolyte fuel cell using a membrane-electrode structure obtained by the prodn. method. Moreover, it also provides an elec. app. and a transport machine that use the above polymer electrolyte fuel cell. A catalyst past comprising a catalyst supported by an electron conducting material and an ion conducting material is applied on a sheet substrate, and it is then dried, so as to form electrode catalyst layers. The electrode catalyst layers are thermally transferred onto each side of a polymer electrolyte membrane, so as to form a laminated body. A first slurry comprising a water-repellent material and an electron conducting material is applied on a carbon substrate layer, and it is dried to form a water-repellent layer, and then, a second slurry comprising an electron conducting material and an ion conducting material is applied on the water-repellent layer, and it is dried to form a hydrophilic layer, so that a diffusion electrode is formed. The previously formed diffusion electrode is laminated on the electrode catalyst layer through the hydrophilic layer, and they are then pressed under heating, so as to integrate the laminated body and the diffusion electrode.
- IT 701909-66-2DP, reaction product with bisphenol AF and derivatized benzophenone oligomer, sulfonated  
RL: DEV (Device component use); SPN (Synthetic preparation);  
PREP (Preparation); USES (Uses)  
(method for producing membrane-electrode structure for polymer electrolyte fuel cell)
- RN 701909-66-2 HCAPLUS
- CN Benzenesulfonic acid, 4-(2,5-dichlorobenzoyl)-, 1-methylpropyl ester (9CI) (CA INDEX NAME)



- IC ICM H01M008-10  
ICS H01M004-88; H01M004-96; B05D005-12
- INCL 429030000; 427115000; 502101000; 429044000
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38
- IT 122325-09-1DP, reaction products with derivatized benzophenones, sulfonated 463954-50-9DP, reaction product with bisphenol AF and derivatized benzophenone oligomer, sulfonated 701909-66-2DP, reaction product with bisphenol AF and derivatized benzophenone oligomer, sulfonated  
RL: DEV (Device component use); SPN (Synthetic preparation);

PREP (Preparation); USES (Uses)  
 (method for producing membrane-electrode  
 structure for polymer electrolyte fuel cell)

L15 ANSWER 32 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2003:913207 HCAPLUS  
 DOCUMENT NUMBER: 139:396487  
 TITLE: Sulfonated copolymer for polymer electrolyte  
 membrane  
 INVENTOR(S): Cao, Shuguang; Xu, Helen; Chen, Jingping  
 PATENT ASSIGNEE(S): Polyfuel, Inc., USA  
 SOURCE: PCT Int. Appl., 32 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 6  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003095509	A1	20031120	WO 2003-US315178	20030513
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2003237849	A1	20031111	AU 2003-237849	20030513
CA 2485727	AA	20031120	CA 2003-2485727	20030513
EP 1517929	A1	20050330	EP 2003-736609	20030513
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
CN 1668656	A	20050914	CN 2003-816349	20030513
JP 2006506472	T2	20060223	JP 2004-503520	20030513
US 2006135657	A1	20060622	US 2006-350228	20060207
PRIORITY APPLN. INFO.:			US 2002-381136P	P 20020514
			US 2002-426540P	P 20021115
			US 2003-446395P	P 200302

10

US 2003-449299P

P

200302  
20

US 2003-438299

A3

200305  
13

WO 2003-US15178

W

200305  
13

AB This invention relates to sulfonated copolymers for proton-conducting membranes allowing the dimensional stability of polymer electrolyte membrane over a wide temp. range and avoiding excessive membrane swelling in direct methanol fuel cells. The method for the prepn. of a sulfonated polymers is included the steps of combining a first monomer having at least one sulfonate group and having at least two leaving groups with a second comonomer having at least two groups that can displace at least one leaving group of the first monomer and a third comonomer having at least two leaving groups, and a fourth comonomer having at least two displacing groups that can react with the leaving groups of either said first comonomer or said third comonomer and is used for proton exchange membranes, catalyst coated membranes and membrane electrode assembly prepn. Exemplified polymer is prepd. by heating of the mixt. of 9.13 g of bisphenol A, 5.67 g of 4,4'-difluorobenzophenone, 5.91 g of 4,4'-difluoro-3,3'-disulfonyl-benzophenone and 7.2 g of potassium carbonate in a mixt. of DMSO and toluene at 150° for 4 h and keeping at at 180° for 6 h with further pptn. with acetone or methanol. The dry polymer is dissolved in DMAC for 20% coating soln. and the obtained 2 mil thick membrane is soaked in sulfuric acid for 16 h.

IT 625392-07-6P 625392-08-7P 625392-10-1P  
625392-12-3P 625392-14-5P 625392-16-7P  
625392-17-8P 625392-19-0P 625392-21-4P  
625392-23-6P 625392-25-8P 625392-26-9P  
625392-28-1P 625392-30-5P 625392-32-7P  
625392-35-0P 625392-38-3P

RL: DEV (Device component use); IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(sulfonated copolymer for polymer electrolyte membrane)

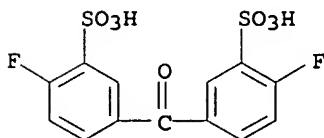
RN 625392-07-6 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with bis(4-fluorophenyl)methanone and 4,4'-(1-methylethylidene)bis[phenol] (9CI) (CA INDEX NAME)

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CRN 625392-06-5

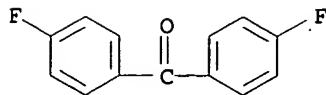
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CM 2

CRN 345-92-6

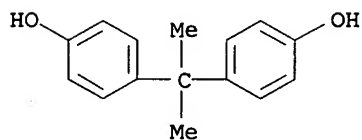
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CM 3

CRN 80-05-7

CMF C15 H16 O2



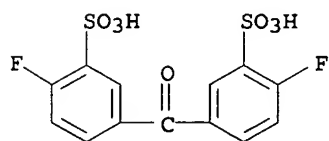
RN 625392-08-7 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
1,4-benzenediol, bis(4-fluorophenyl)methanone and  
4,4'-(1-methylethylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

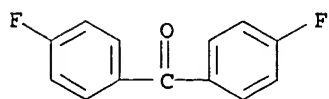
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CM 2

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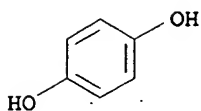
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CM 3

CRN 123-31-9

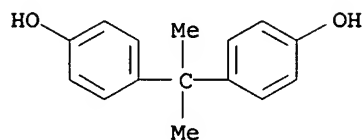
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CM 4

CRN 80-05-7

CMF C15 H16 O2



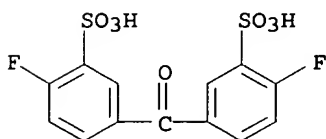
RN 625392-10-1 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
bis(4-fluorophenyl)methanone and 4,4'-thiobis[phenol] (9CI) (CA  
INDEX NAME)

CM 1

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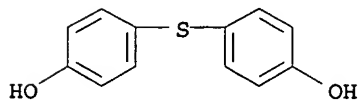
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CM 2

CRN 2664-63-3

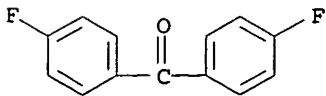
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CM 3

CRN 345-92-6

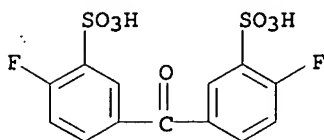
CMF C13 H8 F2 O



RN 625392-12-3 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
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(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

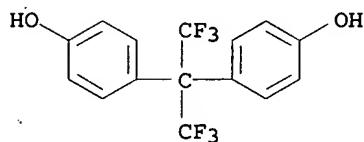
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CRN 625392-06-5  
CMF C13 H8 F2 O7 S2



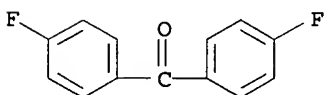
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CRN 1478-61-1  
CMF C15 H10 F6 O2



CM 3

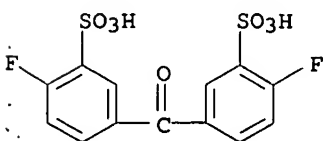
CRN 345-92-6  
CMF C13 H8 F2 O



RN 625392-14-5 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
1,4-benzenediol, bis(4-fluorophenyl)methanone and  
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]  
(9CI) (CA INDEX NAME)

CM 1

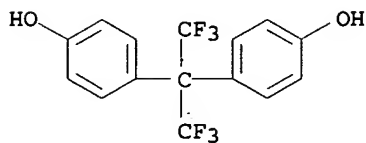
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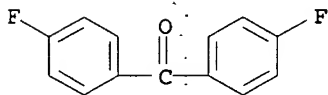
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CMF C15 H10 F6 O2



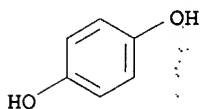
CM 3

CRN 345-92-6  
CMF C13 H8 F2 O



CM 4

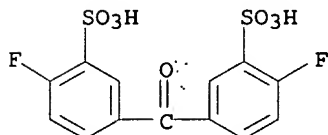
CRN 123-31-9  
CMF C6 H6 O2



RN 625392-16-7 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
1,4-benzenediol, bis(4-fluorophenyl)methanone and  
4,4'-cyclohexylidenebis[phenol] (9CI) (CA INDEX NAME)

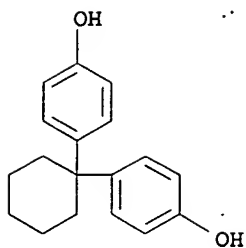
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CRN 625392-06-5  
CMF C13 H8 F2 O7 S2



CM 2

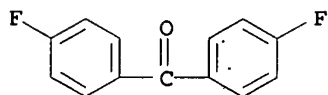
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CMF C18 H20 O2



CM 3

CRN 345-92-6

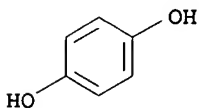
CMF C13 H8 F2 O



CM 4

CRN 123-31-9

CMF C6 H6 O2



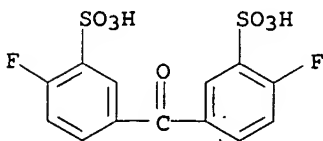
RN 625392-17-8 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
bis(4-fluorophenyl)methanone and 4,4'-cyclohexylidenebis[phenol]  
(9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

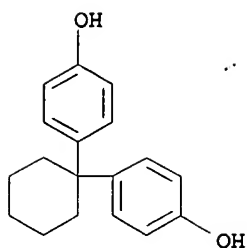
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CM 2

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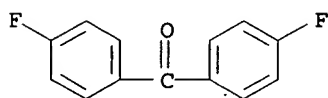
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CM 3

CRN 345-92-6

CMF C13 H8 F2 O



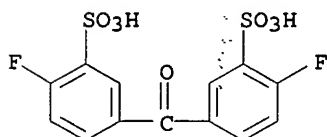
RN 625392-19-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
4,4'-cyclohexylidenebis[phenol] and 1,1'-sulfonylbis[4-  
fluorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

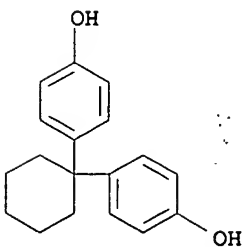
CMF C13 H8 F2 O7 S2



CM 2

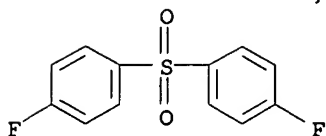
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CMF C18 H20 O2



CM 3

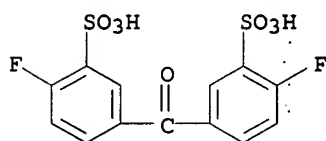
CRN 383-29-9  
CMF C12 H8 F2 O2 S



RN 625392-21-4 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
bis(4-fluorophenyl)methanone, 4,4'-cyclohexylidenebis[phenol] and  
2,6-difluoropyridine (9CI) (CA INDEX NAME)

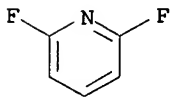
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CRN 625392-06-5  
CMF C13 H8 F2 O7 S2



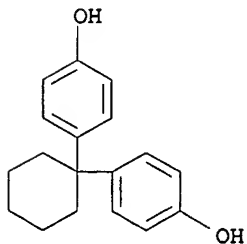
CM 2

CRN 1513-65-1  
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CM 3

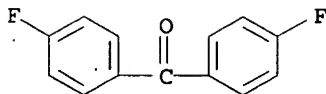
CRN 843-55-0  
CMF C18 H20 O2



CM 4

CRN 345-92-6

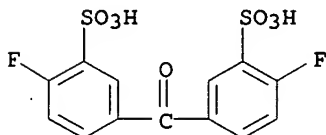
CMF C13 H8 F2 O



RN 625392-23-6 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
 bis(4-fluorophenyl)methanone and 4,4'-(9H-fluoren-9-  
 ylidene)bis[phenol] (9CI) (CA INDEX NAME)

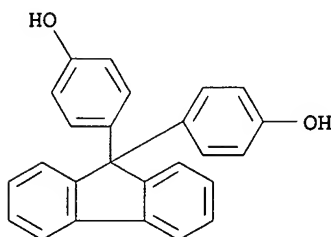
CM 1

CRN 625392-06-5  
 CMF C13 H8 F2 O7 S2



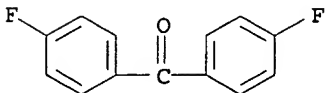
CM 2

CRN 3236-71-3  
 CMF C25 H18 O2



CM 3

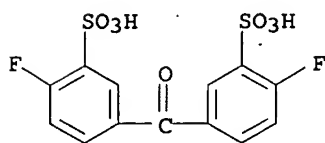
CRN 345-92-6  
 CMF C13 H8 F2 O



RN 625392-25-8 HCAPLUS  
 CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
 bis(4-fluorophenyl)methanone, 4,4'-cyclohexylidenebis[phenol] and  
 4,4'-(9H-fluoren-9-ylidene)bis[phenol] (9CI) (CA INDEX NAME)

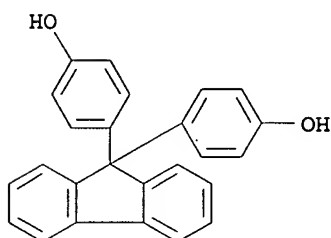
CM 1

CRN 625392-06-5  
CMF C13 H8 F2 O7 S2



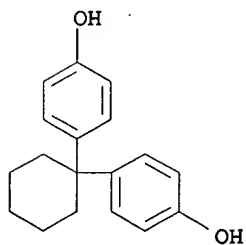
CM 2

CRN 3236-71-3  
CMF C25 H18 O2



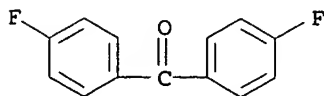
CM 3

CRN 843-55-0  
CMF C18 H20 O2



CM 4

CRN 345-92-6  
CMF C13 H8 F2 O

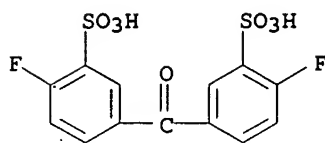


RN 625392-26-9 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
bis(4-fluorophenyl)methanone, 4,4'-cyclohexylidenebis(phenol) and  
4,4'-oxybis(phenol) (9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

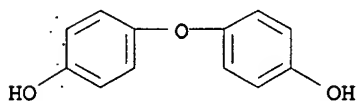
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CM 2

CRN 1965-09-9

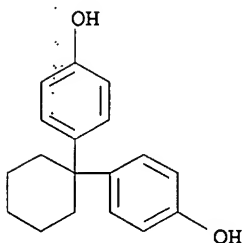
CMF C12 H10 O3



CM 3

CRN 843-55-0

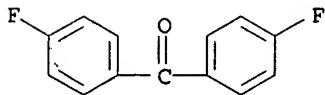
CMF C18 H20 O2



CM 4

CRN 345-92-6

CMF C13 H8 F2 O

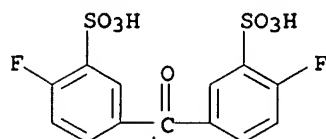


RN 625392-28-1 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
 bis(4-fluorophenyl)methanone, 4,4'-(9H-fluoren-9-ylidene)bis[phenol]  
 and 4,4'-oxybis[phenol] (9CI) (CA INDEX NAME)

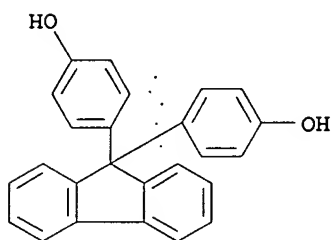
CM 1

CRN 625392-06-5  
CMF C13 H8 F2 O7 S2



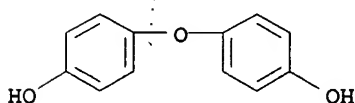
CM 2

CRN 3236-71-3  
CMF C25 H18 O2



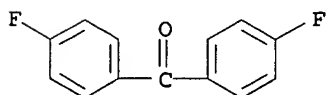
CM 3

CRN 1965-09-9  
CMF C12 H10 O3



CM 4

CRN 345-92-6  
CMF C13 H8 F2 O



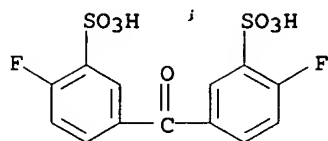
RN 625392-30-5 HCAPLUS  
CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
bis(4-fluorophenyl)methanone, 4,4'-oxybis[phenol] and  
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol]  
(9CI) (CA INDEX NAME)

CM .1

CRN 625392-06-5



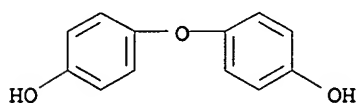
CMF C13 H8 F2 O7 S2



CM 2

CRN 1965-09-9

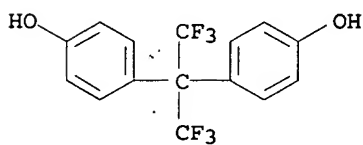
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CM 3

CRN 1478-61-1

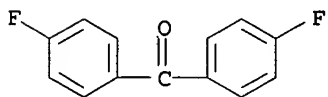
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CM 4

CRN 345-92-6

CMF C13 H8 F2 O



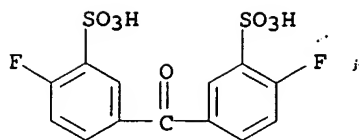
RN 625392-32-7 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
bis(4-fluorophenyl)methanone and 4'-methyl[1,1'-biphenyl]-2,5-diol  
(9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

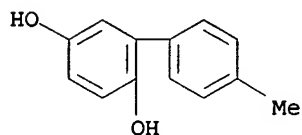
CMF C13 H8 F2 O7 S2



CM 2

CRN 10551-32-3

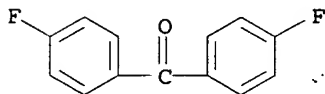
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CM 3

CRN 345-92-6

CMF C13 H8 F2 O



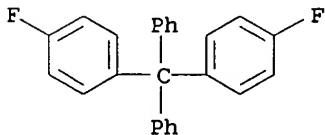
RN 625392-35-0 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with bis(4-fluorophenyl)methanone and 1,1'-(diphenylmethylene)bis[4-fluorobenzene] (9CI) (CA INDEX NAME)

CM 1

CRN 625392-34-9

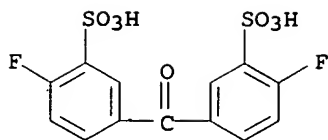
CMF C25 H18 F2



CM 2

CRN 625392-06-5

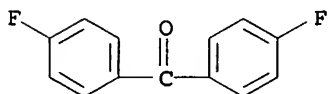
CMF C13 H8 F2 O7 S2



CM 3

CRN 345-92-6

CMF C13 H8 F2 O



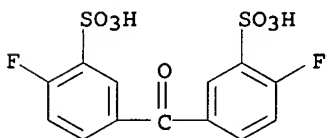
RN 625392-38-3 HCAPLUS

CN Benzenesulfonic acid, 3,3'-carbonylbis[6-fluoro-, polymer with  
bis(4-fluorophenyl)methanone and 4,4'-[1,4-phenylenebis(1-  
methylethylidene)]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 625392-06-5

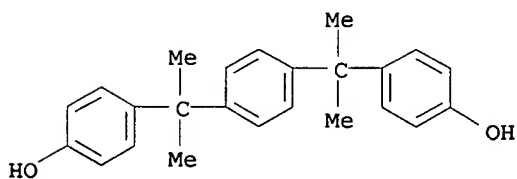
CMF C13 H8 F2 O7 S2



CM 2

CRN 2167-51-3

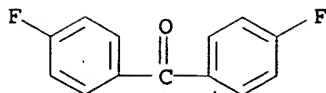
CMF C24 H26 O2



CM 3

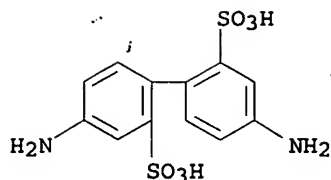
CRN 345-92-6

CMF C13 H8 F2 O



IC ICM C08F016-36  
 CC 37-3 (Plastics Manufacture and Processing)  
 Section cross-reference(s): 52  
 ST sulfonated copolymer direct methanol fuel cell; proton  
 exchange membranes catalyst coated membrane  
 membrane electrode assembly  
 IT 625392-07-6P 625392-08-7P 625392-10-1P  
 625392-12-3P 625392-14-5P 625392-16-7P  
 625392-17-8P 625392-19-0P 625392-21-4P  
 625392-23-6P 625392-25-8P 625392-26-9P  
 625392-28-1P 625392-30-5P 625392-32-7P  
 625392-35-0P 625392-38-3P  
 RL: DEV (Device component use); IMF (Industrial manufacture); TEM  
 (Technical or engineered material use); PREP (Preparation)  
 ; USES (Uses)  
 (sulfonated copolymer for polymer electrolyte membrane)  
 REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR  
 THIS RECORD. ALL CITATIONS AVAILABLE IN  
 THE RE FORMAT

L15 ANSWER 33 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2002:507115 HCAPLUS  
 DOCUMENT NUMBER: 137:386951  
 TITLE: Sulfonated polyimides for fuel cell electrode  
 membrane assemblies (EMA)  
 AUTHOR(S): Besse, S.; Capron, P.; Diat, O.; Gebel, G.;  
 Jousse, F.; Marsacq, D.; Pineri, M.; Marestin,  
 C.; Mercier, R.  
 CORPORATE SOURCE: SORAPEC, Fontenay sous bois, 94 124, Fr.  
 SOURCE: Journal of New Materials for Electrochemical  
 Systems (2002), 5(2), 109-112  
 CODEN: JMSEFQ; ISSN: 1480-2422  
 PUBLISHER: Journal of New Materials for Electrochemical  
 Systems  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB The state of the art in the field of fuel cell technol. shows that  
 Nafion is a well-known std. for its use as polymeric proton exchange  
 membrane. Indeed, this material is characterized by very high  
 performance and durability. However, some limitations could prevent  
 a wide industrial scale development such as the manufg. cost, and to  
 some extent difficulties encountered to recycle the EMA related to  
 the high chem. stability of the perfluorinated materials. However,  
 over the last few years, an important research activity has been  
 devoted to propose an alternative system and, as a consequence, has  
 led to the synthesis of a large array of sulfonated non fluorinated  
 polymers. In this perspective, we are interested in developing  
 proton exchange membranes based on sulfonated polyimides. This work  
 reports the performance obtained with such membranes, in a new  
 design EMA.  
 IT 117-61-3  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
 process); PROC (Process)  
 (reaction products with 1,4,5,8-tetracarboxylic acid; sulfonated  
 polyimides for fuel cell electrode  
 membrane assemblies)  
 RN 117-61-3 HCAPLUS  
 CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino- (9CI) (CA INDEX  
 NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 IT 117-61-3  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)  
 (reaction products with 1,4,5,8-tetracarboxylic acid; sulfonated polyimides for fuel cell electrode membrane assemblies)  
 REFERENCE COUNT: 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L15 ANSWER 34 OF 34 HCAPLUS COPYRIGHT 2006 ACS on STN  
 ACCESSION NUMBER: 2001:661757 HCAPLUS  
 DOCUMENT NUMBER: 135:229352  
 TITLE: Fabrication of electrode-membrane assemblies containing heat-stable polymers for fuel cells  
 INVENTOR(S): Marsacq, Didier; Jousse, Franck; Pineri, Michel; Mercier, Regis  
 PATENT ASSIGNEE(S): Commissariat a l'Energie Atomique, Fr.  
 SOURCE: PCT Int. Appl., 60 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: French  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001065623	A1	20010907	WO 2001-FR624	20010302
W: CA, JP, US RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
FR 2805927	A1	20010907	FR 2000-2765	20000303
FR 2805927	B1	20020412		
CA 2400146	AA	20010907	CA 2001-2400146	20010302
EP 1259995	A1	20021127	EP 2001-911830	20010302
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI, CY, TR				
JP 2003526184	T2	20030902	JP 2001-564409	20010302
US 2003022054	A1	20030130	US 2002-220068	20020828
PRIORITY APPLN. INFO.:			FR 2000-2765	A 200003

03

WO 2001-FR624

W

200103

02

AB Electrode-membrane-electrode (EME) assemblies for fuel cells are prepd. by (1) pouring a heat-stable polymer onto a support to obtain a heat-stable polymer soln. film, (2) partly drying the polymer film by evapg. the solvent from the soln., (3) depositing an electrode on the surface of the polymer film during the drying process before it is completely dry, (4) completely drying the assembly, (5) sepg. the assembly of the membrane and the electrode from the substrate. In step (3), the active surface of the electrode faces the surface of the polymer film. The heat-stable polymers are selected from sulfonated polyimides, polyether-polysulfones, polystyrene, polyether-polyketones, polybenzoxazoles, polybenzimidazoles, and poly-p-phenylenes.

IT 196309-83-8, [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-oxybis[benzenamine]

RL: DEV (Device component use); USES (Uses)  
(fabrication of electrode-membrane assemblies  
contg. heat-stable polymers for fuel cells)

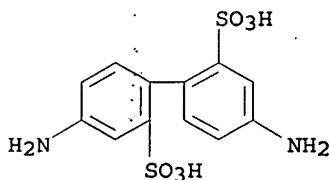
RN 196309-83-8 HCAPLUS

CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-diamino-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-oxybis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 117-61-3

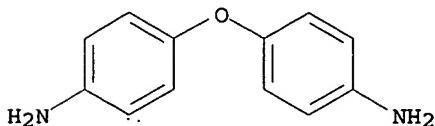
CMF C12 H12 N2 O6 S2



CM 2

CRN 101-80-4

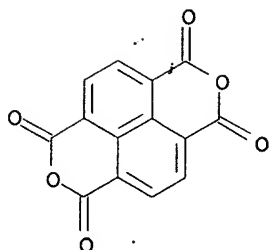
CMF C12 H12 N2 O



CM 3

CRN 81-30-1

CMF C14 H4 O6



IC ICM H01M008-10  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
IT 196309-83-8, [1,1'-Biphenyl]-2,2'-disulfonic acid,  
4,4'-diamino-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-  
1,3,6,8-tetrone and 4,4'-oxybis[benzenamine]  
RL: DEV (Device component use); USES (Uses)  
(fabrication of **electrode-membrane** assemblies  
contg. heat-stable polymers for **fuel cells**)  
REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE  
FOR THIS RECORD. ALL CITATIONS AVAILABLE  
IN THE RE FORMAT

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## EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1407	(429/33).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/08/18 10:19
L2	51	1 and diphenyl ether	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/18 10:29
L3	16	2 and polyarylene with (sulfonic acid or sulfonated)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/18 10:20
L4	155	(electrolyte or membrane) with (sulfonic acid or sulfonated) with polyarylene	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/18 10:21
L5	117	4 and fuel cell	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/18 10:25
L6	14	4 and divalent group	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/18 10:22
S1	57986	"429".clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/18 10:19
S2	19	S1 and (electrolyte or membrane) with sulfonic acid with polyarylene	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/18 10:21
S3	2	("5403675").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	OFF	2006/08/17 14:44



## EAST Search History

S4	57986	"429".clas.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/17 15:27
S5	1	S4 and (electrolyte or membrane) with aromatic with sulfonic acid with ester	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/17 15:28
S6	20	S4 and (electrolyte or membrane) same sulfonic acid with polyarylene	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/17 16:25
S7	35	S4 and (electrolyte or membrane) same sulfonat\$3 with polyarylene	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	ADJ	ON	2006/08/17 16:25